DOCUMENT RESUME

ED 038 207 95 RC 004 232

TITLE	Outdoor Education Manual.
INSTITUTION	Nashville - Davidson County Metropolitan Public Schools, Tenn.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C. Bureau of Research.
PUB DATE	Jul 66
NOTE	113p.
EDRS PRICE	EDRS Price MF-$0.50 HC-$5.75
DESCRIPTORS	*Concept Teaching, Creative Teaching, Curriculum Enrichment, Ecology, Educational Innovation, Educational Programs, *Elementary Grades. *Environmental Education, Evaluation, Instructional Aids, Instructional Materials, Mobile Classrooms, Nature Centers, *Outdoor Education, Sciences, *Teaching Guides, Teaching Skills

ABSTRACT

Creative ways to use the outdoors as a part of the regular school curriculum are outlined in this teacher's manual for the elementary grades. Presented for consideration are the general objectives of outdoor education, suggestions for evaluating outdoor education experiences, and techniques for teaching outdoor education. The purpose and functions of a mobile unit--designed as a workshop, library, and laboratory to aid teachers--are discussed, and a list of equipment available on the unit (e.g., compasses, maps, and binoculars) is presented. The major portion of the manual lists outdoor education concepts by subject matter and grade level and suggests ways the concepts can be incorporated in the everyday curriculum. (DB)

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OUTDOOR EDUCATION MANUAL

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Compiled by
Teachers in the Outdoor Education Session
of the Summer In-Service Workshop (66-07)

through
Title I
of the

ELEMENTARY AND SECONDARY EDUCATION ACT OF 1965

with
additional material from
the
Outdoor Education Center, Southern Illinois University

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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METROPOLITAN NASHVILLE-DAVIDSON COUNTY SCHOOLS

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FOREWORD

This manual has been compiled in an effort to help the elementary teachers see how the out of doors can be utilized in their everyday teaching. By placing the activities under general concepts, it is hoped that the teachers can include outdoor education in their planning, and fully explore the many ways of teaching.

Most of the activities have been drawn from both personal experiences of the ESEA Summer Workshop in Outdoor Education and the many groups throughout the country now engaged in outdoor education.

A special thanks should be extended to Dr. Tom Rillo of the Southern Illinois Center for Outdoor Education for many of the materials and activities used in this manual.

This manual lists but a few of the many possible outdoor activities that can be included in the school curriculum.

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Note: References follow each grade level section in the manual

Outdoor Education is a method of teaching--it is not a subject in itself, but rather uses all subject areas. There are parts of the curriculum that can best be taught in the out of doors. It is not a new idea in education, but one which has always been used by creative teachers. Outdoor Education is not an attempt to do away with the classroom, but rather to broaden the scope of enrichment in teaching and better prepare children for living in our world. Children, wherever they live and whatever they do, in and out of school, meet problems that involve both experiences and understandings. They achieve these understandings best through first-hand experiences and actual, purposeful contacts with materials, forces and processes that affect their own lives.

To be effective, teaching must be closely related to circumstances that will arise outside the classroom. Young, or old, we learn best by doing. The more realistic the learning activity is, the more meaningful and lasting will be the lesson. There is little justification for merely looking at something which can be touched and handled or used, or for just textbook presentations when the real life situations are at hand. In the outdoor laboratory, the pupil may, through observation and direct experience, develop appreciations, skills and understandings that will supplement the indoor curriculum of the school. Outdoor Education, then, has become a practical approach to aspects of those subjects which are normally taught only in the classroom. Outdoor Education is the effective utilization of the natural environment to help promote the growth, welfare and total education of the student.

OBJECTIVES OF OUTDOOR EDUCATION

1. To provide a method for integrating specific subject matter areas

2. To reinforce classroom learning through actual experience

3. To provide children with an appreciation of nature and the world about them

4. To provide an interesting method of presenting curriculum

5. To enrich the existing curriculum

6. To provide motivation for classroom learning

SUGGESTIONS FOR EVALUATION OF OUTDOOR EDUCATION EXPERIENCES

(Adapted from Southern Illinois University - Dr. Tom Rillo)

A. Suggested evaluations for observation:

1. Were the objectives for the day clearly planned, stated, and understood by all?
2. Was the group adequately prepared?
   a)clothing, b)equipment, c)reference materials, and d)background information for areas of study
3. How large was the group? (ratio of leader to the pupils)
4. Were the group objectives flexible enough to permit unplanned learning activities?
5. Were all of the children actively involved in the learning process? (learning by doing)
6. Did they appear to be having fun at the same time that they were learning?
7. Did the leader provide too many answers to the children's questions?
8. Was the atmosphere of discovery, exploration, and problem solving evident?
9. How well did the group seem to understand the vocabulary and concepts presented?
10. Did the lessons appear to hold the children's interest?
11. Was the length of time adequate for each lesson taught?
12. Were the uses of many of the five senses utilized in the learning process?
13. Did the leader have adequate control and supervision in guiding the children's learning experiences?
14. Were necessary safety precautions observed when walking through the woods and fields?
15. Do you feel that those lessons taught in the out-of-doors were best learned there rather than in a classroom?
16. Were some of the learning experiences correlated with what was being studied in the classroom?

B. Evaluation of individual student participation

1. Teachers may choose written evaluation on content areas.
2. Teachers should observe participation.
3. Evaluate concepts taught--not specific content.

Evaluation of the program of Outdoor Education can only come as the teacher sees the children approach the problems and ideas with understanding and awareness. The teacher, herself, will be the best judge of whether the outdoor experience has enriched the individual child and his knowledge.

TEACHING OUTDOORS TECHNIQUES

(Adapted from Southern Illinois University - Dr. Tom Rillo)

Problem solving situations in Outdoor Education:

1. Criteria for the selection of the problems

    a. The problems should involve the conservation of plants, animals and other physical and cultural resources.
    b. The problems should be most effectively examined in the outdoors environment.
    c. The solving of the problems should take a maximum of two or three hours in the out-of-doors.
    d. The problems should be suitable for solving by intermediate and junior level pupils.
    e. The equipment necessary for solving the problems should be available through borrowing, inexpensive purchasing or constructing by teachers or students.

2. Size of group should be kept small, when possible

    Classes may be organized into committees to work on different aspects of the problems to be solved.

3. Sites available for Outdoor Education

    a. school grounds
    b. community walks
    c. field trips
    d. day center
    e. outdoor school for more than one day's study

THE MOBILE UNIT

The Mobile Unit will be a workshop, library, and laboratory. It will have materials and equipment not found in an elementary school. When a teacher is planning a unit in any subject area where she feels Outdoor Education can help to enrich that unit, she may request help from the Consultant in Outdoor Education. Help can come in three ways:

A. Materials for the classroom - pictures, charts, special teaching materials, books

B. Visit by the Mobile Unit to the school ground or on a field trip

C. Follow-up with materials requested by the teachers from materials used or objects seen in the Mobile Unit

The Mobile Unit can come to a school for an hour, a day, or longer.

The Consultant will work with the teacher on concepts to be taught, and will work with the children at school or on a field trip.

Materials such as weather stations, compasses, etc., can be left at the school for a length of time.

Materials Available on Mobile Outdoor Education Unit

- rock tumbling machine
- compasses
- microscopes
- hand lenses
- insect and animal cages
- tree borer
- soil borer
- nets
- animal skeletons
- weather station instruments
- hand tools
- craft tools
- plastic bottles and vials
- pedometer
- insect and plant presses and mounts
- collecting bags
- rock hammers and chisels
- collection boxes
- soil testing equipment
- rock hardener testers
- contour map sets
- map reading models
- tapes, yardsticks, Biltmore sticks
- books and games
- balloons
- craft materials
    - burlap
    - glue
    - wood
    - wire
    - sketching materials
    - liquid plastic
    - molds
    - plaster for track casting
    - ozalid paper
    - findings
    - brushes
- sets of plastic leaves and tracks
- stop watch
- binoculars
- charts and exhibits
- rock collections
- bird models
- weather maps
- seed collections
- poster boards
- cord

(Outdoor Education Materials to be used in classroom or by teacher without Mobile Unit) To be loaned for short periods

hand lenses
compasses
insect cages
plant and insect mounts
nets
weather station
rock hammers and chisels
contour map sets
map reading model
books and games
poster board - cord - balloons
sets of plastic leaves and tracks
plaster
charts and exhibits

craft material (packed in boxes)
  plastic set
  plaque (burlap, wood, glue) set
  jewelry findings
  ozalid paper set (glass, paper)
  carving set (knives, sandpaper)
  binoculars
stop watch
pedometer
soil testing equipment
rock and mineral testing equipment
bee hives
pictures, directions for making equipment, special instructional material

THE OUTDOOR EDUCATION NATURE CENTER

The Nature Center is located near Joelton on 130 acres of land. A full-time outdoor teacher is in charge, but the trails are self-guiding so that the classroom teacher takes the class on the trail. The area includes an exhibit house and office and a shelter for group meeting and eating. There is a water fountain, but only outdoor latrines are provided. The land is rugged and will be kept as natural as possible so that teacher and children should dress accordingly.

The trails include rock and mineral, animal, forestry, plant, compass, conservation, stream life, and a seasonal trail, "signs of spring" or "signs of fall". These are numbered stations along the trail as well as labeled trees, plants, and other points of interest. Some stations are activity stations where the children enjoy an activity relating to the trail.

A teacher's manual on the Nature Center can be obtained, as well as grade level material on each trail.

OUTDOOR EDUCATION
FOR
GRADES I AND II

Aim: To present activities in the out of doors that will help teach concepts developed in the school program.

Science

General objectives:

A. To be able to recognize some of the common plants and animals in the local area
B. To understand some of the interrelationship of plants and animals in different environments of the local area
C. To know uses of plants and animals
D. To see how weather affects everything
E. To understand how rocks and soil work together

Concept-Wind is blowing air.

(activities)

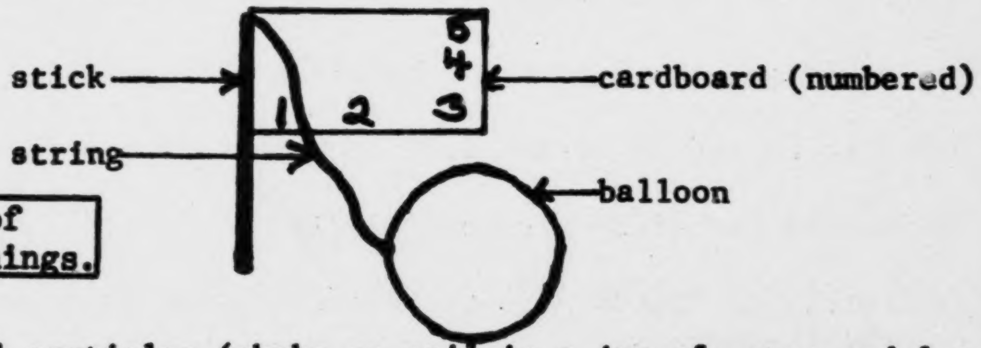
Find wind speed with wind measurer (card, thread and balloon - see diagram below) and flag movement.

Find wind direction with balloon and bird feather vane.

Compare effect of objects (such as building or vegetation) on wind.

Discuss the air--where is it? Can I feel, hear, taste or smell it? Can it move, push? Can I live without it?

See how wind helps plant by throwing light objects in the air to see them move. Blow dandelion seeds.



Concept-Soil is made up of many different things.

(activities)

Compare size of soil particles (shake up soil in a jar of water and let it settle).

Compare color of soil in different places.

Smell soil to find out if it has an odor.

Compare color of moisture of soil from the surface to two feet deep (use soil auger).

Look at soil with a hand lens. Separate the parts of soil into piles of same material (pebbles, roots, leaves, sand, etc.)

Make soil by rubbing two rocks together.

Science (cont.)

Concept-Shadows come with light.

(activities)
Mark position of the shadow on the ground with chalk or sticks. (note change in length and position after a few minutes, few hours) What causes the shadow to move?

Compare shadows. (as cast by flag pole, posts, trees, person, building, etc.)

Compare shapes of shadows to the object casting the shadow.

Observe how shadows fall according to the position of the sun.

Concept-Insects are animals with legs.

(activities)
Use a net to gather and collect insects. Imbed in plastic or spread and pin in box. Look at insects under a hand lens--find parts of body--see difference in moths' and butterflies' antenna.

See how many types of insects you can find--notice the difference in wings, size, shape, etc.

Make a collection or chart showing helpful and harmful insects.

Look for eggs or cocoons--keep until they hatch.

Keep live insects and watch them eat.

Find a spider and see why it is not an insect--use spray paint and a paper to get the spider web.

See if you can find other bug-like things that are not insects.

Go to a pond or stream and watch the insects there.

Observe how different insects fly.

Listen for sounds made by insects; using hand lens try to find out how they make the sounds.

Concept-Animals and insects have homes.

(activities)
Find bird nests (in late fall gather some). Take apart to see what they are made of.

Study the ground to find holes that might be homes of insects--dig around to see how they were made.

Find a rotting log. Peel off some of the bark to see what lives underneath. Observe with a hand lens.

Take up rocks to see what might live underneath.

Science (cont.)

Find a pond or stream. Use a net to gather pond life to study. Look along the edge of the bank to see if there are any holes that might be homes.

Look for signs on plants and fruit where insects have been eating. See how they made a home there--use hand lens.

Concept-All days are not alike.

(activities)
Compare cloud formations.

Take temperature as seasons go on--discuss changes.

Put different materials outside in different places--see what happens to it as seasons change (water in jar, paper, material, wood--see how sun, cold, damp, etc. makes it change).

Put water out in sun and shade--note changes day by day.

Put dark material out to catch snow flakes. Look at them under a microscope or hand lens.

Concept-Trees are not alike.

(activities)
Study bark--pattern, texture, and color.

Gather leaves and compare shape, color, and size.

Make leaf prints--spatter, blue print, ozalid paper.

Look at shapes of trees--draw simple shapes, etc. (triangle, half circle, square, etc.)

See how many different colors (in fall) can be gathered in leaves.

Plant some small seedlings of different trees--see which grows the fastest.

Look at a stump. Figure how it was cut and what it might have been used for.

Concept-Some plants and animals live in our schoolyard.

(activities)
See how many birds you see in the yard.

Check for possible homes.

Dig a small plot of ground to see what insects or worms live in it.

Find out how many kinds of trees grow there.

Find as many kinds of bushes, weeds, plants that are growing.

See what kind grows where on the school ground.

Science (cont.)

Concept-Life and growth of a plant is affected by environment.

(activities)
See where things are growing. Find out why plants are not growing in certain spots (such as no sun, water washes off).

Tie cloth bag over branch or plant--observe change.

Find location where plants are growing (cracks in sidewalk, school building, tree stumps). Why did they come up?

Keep a record of growing plants by gluing strips of paper to a piece of cardboard to record growth.

Plant a garden, but do not water one row--observe.

Plant several different kinds of seeds. Watch them grow.

Compare how seeds travel. See places where they might grow or might not.

Look at small plants under trees. Discuss why they might not grow.

Discuss and find evidence of how birds and animals help plant seeds.

Concept-Animals must prepare for winter.

(activities)
Observe birds in the fall--then those who leave and those who stay. Where do they go? Why do some stay?

Watch for animal holes. How do they live there in winter?

Watch animals eating. Where are they getting their food?

Concept-There are many types of birds.

(activities)
Grow some cover (weeds, etc.) near a window--put up a bird feeder.

Look at models of birds--notice differences in shape and size.

Use clue chart to identify the common birds in the school yard and home (see appendix).

Watch birds flying. How are they different? (use binoculars)

Watch the birds in the trees--notice how they move on the trees. Make a chart of different beak and feet shapes. Discuss why they are different.

Watch birds feeding--where do they get their food? Look for places they might feed.

Watch for bird tracks in mud or sand--make a plaster cast of the tracks.

Science (cont.)

Look for difference in male and female birds. Discuss why they are different. Watch them at nesting time--how do they build their nest? What do they do?

Concept-Matter exists in different forms.

(activities)
Gather different forms of matter--rock, plant, root. Look at the difference. Discuss living and non-living things.

Get three states of matter--solid, liquid or gas. Put in bag (rock, water, air). Test difference by feeling, seeing, smelling. Look at difference in shape as they are poured out (rock has a shape of its own, water takes on different shapes, and air cannot be seen). Drop in water to show air can be seen this way.

Have children in groups outside list things around them under three headings.

Show how a solid substance can change to a liquid and vice versa. Put ice cube in glass in sun and place thermometer in the glass. Place another beside the glass. Watch both change. Why?

Put water in a pan. Take reading with a thermometer. Put both in a freezer and check at the end of the day. (Loss of heat causes water and liquid to change to a solid.)

Use a thermometer to check areas--in sun, shade, near concrete, in grass. Why is it hotter?

Put water in a pan; put it in the sun. Where does it go? (liquid into gas)

Language Arts

General objectives:
A. To express oneself well in both written and spoken word
B. To use new vocabulary to express ideas
C. To record what is seen and heard

Concept-Stimulation of the senses can bring new word knowledge.

(activities)
Have each child sit in a small (one square yard) section of ground and focus on one sense or one thing at a time, such as a blade of grass. Look, touch, taste, smell the blade of grass. Ask each child to tell something about the blade (use a recorder). Put the words on the board and use in a story or poem. Use one sense on total area--all sounds, smells, etc.

Watch movement of trees, animals, birds--act these out.

Blindfold one child--give him a nature object and have him turn so they cannot see the object he is holding. Have him describe the object so the others can guess what it is.

Observe nature--write a Japanese Haiku (first line five syllables, second line seven syllables, and third line five syllables).

Concept-By using the senses out-of-doors, one will learn to question, understand and appreciate.

(activities)
Use clue charts to identify trees, birds, flowers. Have list of possible words before using chart.

Record things in view of senses on a nature walk. Use in story or poem.

Write new words in the sand, mud or snow. Act the words.

Study cloud formations and make up stories about what shapes they suggest.

Find as many shapes outside. Be a "living statue" for the other children to guess.

Use sounds heard to write a song.

Compose counting rhymes.

Arithmetic

General objectives:
A. To use standard measuring instruments
B. To understand relationship of arithmetic to everyday living

Concept-Measurement is useful.

(activities)
Gather rocks, nuts, sticks, etc. to use as counters.

Count the numbers of types of things on the school ground (all oak trees, all smoke stacks, etc.).

Make a sun dial with a stick.

Measure shadows at different times of the day.

Measure personal measurements (hand, foot, step).

Locate distance--north, south, east and west. Step off area.

Measure and count the age of trees by counting rings.

Social Studies

General objectives:
A. To create an interest and understanding of things in the area that affect life
B. To develop an understanding of the relationship between man and his environment

Social Studies (cont.)

Concept-Outside the school is a world of wonder.

(activities)
See what building material was used to build the school.

Find out what used to be where the school building stands--can you find any evidence of this?

See where utilities have come into the school.

Find what takes water off the ground and what happens to the water.

Look at the telephone pole. What wood is it? Why is it there? What are the glass and things?

Look at the street and/or sidewalk--what are the cracks for?

Concept-Safety is a part of daily living.

(activities)
Walk to crossing--on correct side of road if no sidewalk. Find out how to cross.

Find tree or something struck by lightning--discuss why. Find best place in school yard in case of a thunder storm.

Find as many kinds of safety signs as possible in area. Discuss each one.

Have your own fire drill. Show why windows are closed by burning a box--one with and one without holes.

Arts and Crafts and Music

General objectives:

A. To give each child an opportunity to explore using a variety of natural material.
B. To encourage the child to express his imaginative ideas or tell of realistic ones.
C. To develop handiness with common tools.
D. To consider art and music as part of everyday living.

Concept-Environment has many forms of design.

(activities)
Find main design in nature:
  circle- sun, moon, berry, woodpecker's hole
  zigzag- tree rings, edge of leaves, building and trees on the horizon
  wavy- path of brook, ripple of water, soil
  straight- tree trunk, vein in leaf, blade of grass, pine needle

Design:
Draw lines to show how bugs fly.

Arts and Crafts and Music

Draw lines to show how branches move in the wind.
Draw lines to show how clouds move in the sky.
Draw bark of trees, feather, stump.

Find design in color:
Use rocks, sticks, leaves to rub on sand paper to make color.

Sketch shapes of trees and cloud.

Draw a sound the way it might be put on paper--using dots, wavy lines, spirals, zigzag lines (wind, dog's bark)

Concept- Natural materials can be used in Arts and Crafts.

(activities)
Gather seeds, pods, weeds, leaves, and stones to make pictures.

Gather small things to embed in plastic for jewelry.

Gather corn husks for dolls and mats.

Make leaf prints.

Gather roots and odd shaped limbs for crazy animals.

Get tree limbs to cut for candle holders.

Gather gourds and sticks to make musical instruments.

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Baby Animals
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FOR
GRADE THREE

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OUTDOOR EDUCATION
FOR
GRADE THREE

Science

General Objectives:

A. To understand the interrelationship of plant and animal life in different environments

B. To be able to recognize some of the common plants and animals

Concept-All plants are not alike.

(activities)

Make clue charts for identifying trees (Curriculum Enrichment Outdoors, pp. 121-122).

Study factors that influence tree growth.

Make leaf prints. Have children go outdoors after a rain. Carefully press a leaf, veins side down into firm mud. The leaf should be left in place until the mud is partially dried. Then the children can remove the leaf and observe the clean print that remains. (Ibid., pl 124)

Observe leaves under microscope.

"Do Detective Work" on a stump. Example: What kind of tree is this stump? How was it cut? etc. . . .

Study the leaf factory.

Tap maple trees.

Use plants and trees to make cooking utensils, fishing hooks and jewelry.

Sketch tree shapes. (silhouettes)

Sniff Hike. (What smells do you have in your area--trees, shrubs, dirt, etc.

Label trees on or near playground. (according to age, type, uses etc.)

Study bark patterns.

Find root systems (exposed by erosion).

Compare deciduous and coniferous tree characteristics.

Compare fruits, seeds, buds, leaf scars, leaves.

Figure the method used in cutting and possible reasons for cutting.

Rub with pencil or crayon on paper to get an impression of the grow rings.

Find decay and insect evidence.

Follow-up for - All plants are not alike.

Make a collection of leaf prints for the board.

Display plants in such groups as---harmful to man, grains, etc. (get plant press and display case from Mobile Unit)

Make tree game using leaf prints (example on Mobile Unit).

Study plant growth with seeds (science books have ideas).

Use flash cards and plastic leaves for identification. (get from Mobile Unit)

Use material gathered to make pictures, weave, wood carve. (materials to help on Mobile Unit)

Use special study materials (call Outdoor Education Office) to make booklets and study guides.

Concept-Living things are products of their heredity and environment.

(activities)
Study seeds--coating, shape, how they travel, size.

Make clue charts for identifying seeds.

Experiment with seeds for birds.

Study some contributions of weeds. Example: Take the children on a field trip to discover the value of weeds as food for birds and builders of soil.

Study various kinds of roots.

Investigate the ways that seeds travel--make a collection. (example: wind, water, animals, etc.)

Discover the number of seeds on a plant.

Field trip to study leaf arrangement. (Have children sketch leaf.)

Find effects of people, animals, sunlight, shade, wind, water, etc. on plant growth.

Find locations where plants grow (cracks in sidewalks, school buildings, tree stumps, etc.)

Science (cont.)

Find effects of plants on erosion and erosion on plants.

Rub plant pigments on sandpaper.

Keep records of the heights of small plants with strips of colored paper by gluing the strips to a piece of cardborad to make a growth graph.

Study the roots of grass or other plants by carefully washing away the soil.

Follow-up for - Living things are products of their heredity and environment.

Examine small plants dug on field trips with hand lens to see roots, stem and leaves.

Put several different kinds of seeds on sponges and allow to sprout. Examine the different plants that come up.

Display the seeds gathered on field trip and make a chart showing how they travel.

Put one plant in the dark and one in the sun. Examine them each day.

Put a sweet potato in water and watch it sprout. (many other activities for classroom in science books)

Drop as many kinds of seeds as you can find in a pan of water--see which ones float. Try to blow those that do across the pan.

Concept-All birds are not alike.

(activities)
Make a clue chart for identifying birds. (Curriculum Enrichment Outdoors, pp. 121-122)

Make a bird survey

Observe the ways that birds get foods. Example: Assign the children to watch the methods and procedures used by birds in getting food. Each child might take one kind of bird to watch and report on.

Make a feeding station.

Observe the number of birds visiting a feeding station.

Describe the bird's song or call note.

Obtain a wing feather and make a sketch of its structure.

Study birds's nests to see how they are made.

Make a chart showing types of bird beaks and feet.

Science (cont.)

Observing Birds by Clifford Knapp, Southern Illinois University

At A Distance

1. Where was the bird seen: flying overhead, woods (where: canopy, overstory, understory, shrub, herbaceious, floor), border of woods, bushes, open field, trees or bushes along fences, roadside, border of stream, marsh, pond or lake, garden, orchard, near buildings?

2. Compare the size of the bird with that of the crow, the robin, or the English sparrow. Note its silhouette.

3. What were its most striking colors: gray, brown, black, chestnut, white, blue, red, yellow, orange, green, olive?

4. Did it show flash colors when flying? If so where and what color? (wing, tail, rump, under tail)

5. In action was it: slow and quiet or active and nervous?

6. Did it occur alone or in a flock?

7. In flying did it go: straight and swift, dart about, up and down, wave-like, flap its wings constantly, sail or soar with wings steady, flap the wings and then sail?

8. Describe its song or call note by moving your finger up and down in rhythm, by drawing a line graph of the notes, or by fitting words to the song or call note.

9. Where did it sit when singing? Did it sing while flying?

At Closer Range

10. Colors and markings of: feet, tail, bill, nape, crown, breast, rump, chin, throat, eye, back. (If present: wing bars, eye streak, eye ring, crest)

11. Was the bill: slender and long, short and thick, medium, curved, hooked?

12. Was the tail: forked, notched, square, rounded?

Long Range Study

13. What is the food of the bird and how is it obtained?

14. Where does the bird spend the winter? Does it migrate?

15. Describe the nest: where placed, how high above ground, how supported, of what materials is the outside made, how is it lined, size, color, and number of eggs?

16. How are the young fed and cared for? What are the colors of plumage of the young birds?

17. How is the bird beneficial to us?

18. What is the name of the bird?

Science (cont.)

Follow-up for - All birds are not alike.

Keep a chart, through the window, on birds that come to the feeder.

Make a chart of a bird with all the parts labeled.

Use your clue chart to draw the birds you saw.

Make a chart of different kinds of bird beaks and claws. List types of birds under each.

Use flash cards and games to learn the birds (on Mobile Unit).

Make a diorama using branches and twigs. Cut out a bird or carve it from wood.

Make a map showing how birds migrate.

Make a mobile with cut-out birds of the area.

Make a scrapbook of birds you know. Use the special study material from the Mobile Unit.

Listen to bird call records (Mobile Unit) and have contest to see how many you know.

Concept-Insects are animals with six legs.

(activities)
Make clue charts for identifying insects.

With a piece of string, mark off a square foot of soil. Count worms and other insects.

Observe an anthill.

Find insect homes (under logs and rocks, in tree bark, etc...)

Investigage insect movements: Capture several kinds of insects without injuring them. Let them move about on a piece of paper and ask the children questions. Example: Do insects always go uphill or downhill? How fast can they move? Can you classify them according to their traveling habits?

Collect insects from different habitats.

Inspect insects attracted to light.

Observe an insect on a plant.

Study Gall Insects (enlarged places that appear on the stems of plants and the branches of trees.),

Find a spider and see why it is not an insect; use spray paint and paper to get the web.

Science (cont.)

Follow-up for - Insects are animals with six legs.

Make a collection, using spreading board, insect mounts (Mobile Unit).

Make a chart showing insects helpful and harmful to man.

Draw a large picture showing parts of insects.

Use the insects in a picture. Imbed them in plastic (get from Mobile Unit).

Set up a display showing homes of insects. Use cardboard cut-outs or dried insects on the display.

Get cocoons and keep them until they hatch.

Make a chart showing the life cycle of insects.

Make a terrarium with insects and small lizards, etc. (other ideas in science books)

Concept-Animals live and grow.

(activities)
Make plaster cast of animal tracks and compare with other animal tracks.

Make brush piles to provide animal food and cover.

Observe pond life.

Set up and use an aquarium or terrarium.

Learn about animals from their tracks.

Observing the care that animals give their young. Have children note and list the different kinds of care that animals give their young. What differences do the length of babyhood make in the habits of these animals?

Study and observe the coverings of animal bodies.

Study how animals protect themselves.

Study animal homes; look for them in trees, barks and ground.

Study pets.

Visit a fish hatchery.

Follow-up for - Animals live and grow.

Make a chart showing the different families of animals.

Use material gathered on field trips to show homes of animals.

Science (cont.)

Make map of area to show where animals live.

Make chart showing how animals protect themselves, what they eat, where they live, etc. (reference: set of books in Materials Library on Animals)

Draw pictures showing animals at different seasons of the year.

Make a notebook of animals in this area.

Use books and flash cards to learn the names of animals (Mobile Unit).

Keep a rabbit or white rat in the classroom--watch how he feeds and lives. (Other activities in science books)

Earth Sciences

General Objectives:

A. To understand general characteristics of rocks and soil as they relate to plants, animals and water.
B. To understand how rock contributes to soil.
C. To understand forces in weather.

Concept- Rocks and soil make up the crust of the earth.

(activities)
Making clue charts for identifying rocks.

Examining small quantity of soil under microscope.

Examine rocks for color, hardness, weight. (collect)

Pound up a piece of soft rock until it becomes soil.

Comparing color of soil in different places.

Smelling soil to find out if it has an odor.

Comparing erosion at different places on the school grounds. (Noting evidences of erosion, i.e. deltas, gullies, exposed roots, etc.)

Class project to eliminate erosion on the school grounds.

Examining soil with hand lens. Separating the parts of soil into piles of the same material. (Pebbles, roots, leaves, sand, etc.)

Squeezing samples of different kinds of soil together to see if they form a ball.

Pouring some water into a jar of soil, noticing the air bubbles that rise to the top.

Comparing plant growth in different kinds of soil.

Examining a rock with hand lens to see the size of the particles. (texture)

Earth Sciences (cont.)

Rub two rocks together to see which one makes a scratch on the other. (hardness)

Compare man-made rock (bricks) to naturally made rocks.

Make a survey of the different kinds of rocks on the school grounds.

Find rocks that show signs of rusting.

Find ways that rocks are useful to man.

Listen to different soils when rubbed between the fingers and held to the ear.

Follow-up for - Rocks and soil make up the crust of the earth.

Make a chart of the different kinds of rocks in this area.

Draw a picture showing how we use rocks.

Use tumbled rocks to make key rings, jewelry (findings on Mobile Unit).

Use different kinds of rocks to "paint" pictures on sandpaper.

Investigate minerals in the soil by pouring a mixture of soil and water through a filter. Put the water aside in a glass pie pan. Look at it when the water evaporates. The material left in the pie pan is the mineral in the soil.

Get sand, garden soil, and humus soil; make holes in three coffee cans; put the cans on top of a jar; put a cupful of soil in each can; pour a cupful of water in each can; watch to see which soil holds the water the longest. Why? Time how long it takes the water to run through each kind of soil.

Concept-All days are not the same.

(activities)
Record and read weather reports.

Measure precipitation.

Study snow flakes using a hand lens and black cloth.

Build weather instruments.

Observe a rainbow.

Identify types of clouds. Have the children keep records for several days of the kinds of clouds that are visible. Encourage them to suggest names or classifications for the cloud types that they see. Then help them to learn to recognize the following common types of clouds.

Earth Sciences (cont.)

a. Cirrus clouds- curly white and high up in the sky
b. Stratus clouds- low, thin and foglike
c. Cumulus clouds- pile-up, floating, white masses about a mile high above the land
d. Nimbus clouds- dark gray and rather formless; filled with rain.

Observe the evaporation of water.

Observe the effects of rain on plant and animal life.

Compare cloud formations.

Find wind speed with wind measurer (card and thread) and flag movement.

Find wind direction with balloons and bird feather vane.

Compare effects of objects (such as buildings or vegetation) on wind.

Explore little climates (differences in temperature in different places on the school ground).

See the effect of rain on soil erosion (set up splash boards and water soil with watering can).

Follow-up for - All days are not the same

Keep a daily weather chart on temperature, wind direction, etc.
Cut out forms (clouds, rain, sun, etc.) to paste on calendar.

Make a chart of different kinds of clouds (use cotton).

Bring the daily weather map (from paper) to school and check the forecast.

Make a wet and dry thermometer set (Mobile Unit).

General Science
General Objective:
To see the effect of natural stimuli.

Concept-Shadows come with light.

(activities)
Observe the spectrum. A simple glass prism will divide sunlight into its component colors and will provide a basis for discussion of the spectrum.

Experiment with reflection of light. (Curriculum Enrichment Outdoors, p. 158)

Explore with a magnifying glass.

Test the relation of color to heat.

Experiment with lenses.

General Science (cont.)

Estimate length of shadow in relation to object casting it.

Mark the position of the shadow on the ground with chalk or sticks. (Note the change in length and position after a few minutes and hours,) What causes the shadow to move?

Compare the shadows cast by the flag pole, posts, trees, persons, buildings, etc.

Compare shapes of shadows to the object casting the shadow.

Observe how shadows fall according to the position of the sun.

Follow-up for General Science - many good activities in science books

Concept-Matter exists in various forms: solid, liquid, and gas.

(activities)
Heat Activity: testing the reaction of color to heat
Cut squares of cloth or paper, making them all the same size but of different colors. Have the children place the squares lightly on the snow on a sunny day when there is no wind to blow the squares away. Leave these squares on the snow several hours. Then remove them and observe the amount of snow that has melted under each one. Ask the children to discuss the result of this experiment in terms of how different colors absorb heat and what colors of clothing are best in various seasons.

Liquid Activity: experimenting with freezing liquids
Gather a variety of containers made of different materials (tin, glass, plastic, cardboard, aluminum, iron, steel, brass, and rubber. Fill these containers with water and place them outside in cold weather so that the water will freeze. Observe the freezing process, noting the part of the containers the water freezes first.

Concept-All things fall.

(activities)
Considering Gravity:
The force of gravity is usually taken for granted. Help the children to see the importance of gravity in keeping the balance of nature. Seeds drop to the ground in order to take root and grow new plants. Rain falls, bringing life to plants and animals. Animals that live on the surface of the ground may obtain their entire food supply from falling objects such as seed, nuts and fruit. Leaves and dead branches that drop from trees decay and enrich the soil for plant life.

Encourage the children to find as many examples in nature as they can of the importance of gravity. For instance, frogs have large and strong hind legs to help them jump against gravity's force; and the wings of birds must be both strong and light to overcome gravity.

General Science (cont.)

Concept-Machines are tools of work.

(activities)
Recognizing some simple machines: examples
The woodpecker's bill acts as a wedge in splitting pieces of wood; the woodsman's ax illustrates the wedge.

Levers: Oars are used to row a boat; a fishing pole or rod operates as a lever in the hands of a fisherman. A person lifts something and his arms act as levers operating with the elbow as fulcrums. A seesaw illustrates the law of the lever.

Concept-Things grow and change.

(activities)
Relating shadows and seasons--
Once a week for a period of six or eight weeks at the same time of day and in the same spot, have the children measure the length and direction of their shadows. The shadow of a flag pole on the playground or of some similar object may be measured instead of the children's shadow if desired. At the end of the period of measuring and keeping records, ask the children to try to tell what they can about the changes in shadow length and direction brought about by a change in season. They may wish to use reference books to obtain information on this subject.

Observe the falling leaves in fall.

Observe and study the changes that take place in the spring.

Make a chart of changes that take place in each season.

Write stories about each season which they like best.

Concept-There is more than Earth.

(activities)
Report phases of the moon. Identify surface features through spotting scope.

Observe a rainbow.

Identify cloud types.

Observe the sunrise.

Tell time by the sun.

Study the stars (locating some of the constellations and learning the stories and legends about them).

Discuss man-made satellites--their orbit and functions.

Locating and identifying constellations in the night sky.

Arts and Crafts

General Objectives:

A. To give the child an opportunity to explore a variety of natural media

B. To encourage the child to express his imaginative ideas as well as realistic ones

Concept-There is beauty in nature.

(activities)
Make mobiles--pine cones, leaves, seeds, bits of wood.

Blueprint flowers, leaves or grasses (pp. 99-100 Curriculum Enrichment Outdoors).

Spider-web print: Use a dark piece of cardboard (black) or construction paper. Spray white paint (lacquer) on web until it is coated with the paint. Place board behind the web; the web will stick on the board or paper.

Preparing a display of insects, plants, rocks.

Make buttons from nut shells.

Make a cast of a print or track (pp. 107-108, Curriculum Enrichment Outdoors).

Make paints from rocks (p. 95, An Ecological Approach to Conservation).

Make place mats from leaves and grasses.

Make a feather fan.

Make bird feeders.

Make animals from paper and cardboard.

Make weed arrangments.

Make potato animals (such as porcupine).

Make paperbag animals.

Make seedpod corsages.

Decorate with seeds.

Find examples of characteristics of abstract art in nature.

Record how many colors you can observe in a small area limited by a circle with a two-inch diameter.

Finding "lines" in the environment:
   a. circle - sun, moon, berry, woodpecker's hole

b. zig-zag - tree rings, edges of leaves, building and trees on the horizon
c. wavy- path of a brook, ripple of water, soil
d. straight - tree trunk, vein in a leaf, a pine needle, a blade of grass
e. finding other shapes in the environment

Find design in movement:

a. draw lines to show how different birds fly
b. draw lines to show how branches wave in the wind
c. draw lines to show how clouds move in the sky

Find design in sound:

a. draw a sound the way it might be put down on paper, using dots, light lines, dark lines, zig-zags, spirals, straight and wavy lines (wind in grass and trees, squirrel's noise, dog's bark)

Find design in color:

using rocks, sticks, leaves, etc.--rub on sandpaper to see the color

Find design in texture:

draw and describe the following--bark of trees, stumps, blade of grass, sidewalk, feather

Construct collages from natural materials such as cones, pebbles, twigs, leaves, etc.

Draw a picture about a story read in the out-of-doors.

Use wood charcoal from a fire to make a sketch.

Make animal figures out of objects such as twigs, stones and seed.

Find different shades of the same color in nature.

Imbed natural materials in plastic to make jewelry.

Use tumbled stones for key chains.

Boil roots for natural dye.

Gather roots and odd shaped limbs for a crazy zoo.

Music and Movement

Concept-The sounds of the out-of-doors can be music.

(activities)
Imitate animal sounds.

Indian dances and songs

Interpreting animal movement

Make instruments--rhythm (willow whistle, etc.)

Record animal sounds.

Make up outdoor songs.

Imitate city sounds.

Make and play primitive instruments.

Sing nature songs.

Play singing games (Simon Says).

Imitate wind, rain, etc.

Dance to natural rhythm and sounds such as wind in trees or grasses, flowing water, calls of insects or other animals.

Sing the Kuckuck Song (Melody Time).

Playing Indians (Melody Time).

Dakota Hymn (The Girl Scouts of the USA Pocket Songbook, p. 25).

Navajo Happy Song (The Girl Scouts Pocket Songbook, p. 26).

Mathematics

General Objectives:
A. To use standard measuring instruments
B. To understand the relationship between arithmetic and everyday life

Concept-Measurement is everywhere.

(activities)
Learn to use a compass: With a compass determine the north position to landmarks within a sight. Walk to them and try to return to the starting point using only the compass. (Obtain compass game from Mobile Unit)

Mathematics (cont.)

Measurement:
a. Measure wind, velocity, temperature and precipitation.
b. Measure distance between trees and buildings.
c. Learn personal measurements to use as an estimate (hand span, pace).
d. Dry measure--Weight bushel of corn, wheat and oats (observe differences).
e. Measure how far away lightning is. (Refer to Curriculum Enrichment Outdoors, p. 76)
f. Estimate height of tree by ratio.
g. Count the growth rings in a tree.
h. Compare weight of different kinds of rocks of the same size.

Individual Activities:
Learn to use a bank and store.

Discuss street and home numbers.

Take a tree census. Count all the trees of each variety that can be seen in a walk around the block or along a woodland trail.

Guess the number of leaves on a limb.

Count songs in a music book that deal with pets and nature.

Learn counting songs.

Use number and size concepts on the playground.

Compose counting rhymes.

Build word meaning concept. (example: high, higher, and highest)
What do you see high in the air?
Are the clouds higher than the trees?
What is the highest thing you see?

Collect objects to be used as counters such as acorns, etc.

Follow-up for - Measurement is everywhere.

Measure the room and desks and tables.

Make a chart showing concepts of words using trees and buildings, animals, etc. (high, higher, etc.)

Make a counting board using materials gathered.

Draw a map of school grounds showing (to scale) the size of the buildings, etc.

Language Arts

General Objectives:
A. To express oneself well in both written and spoken word.
B. To read and interpret correctly.

Concept--Senses can help in discovering things.

Language Arts (cont.)

(activities)
Listening:
Listen and describe sounds in the out-of-doors. Examples: sounds made by birds, insects, rustling of leaves, wind, water, rainfall, motor vehicles, etc.

Learn how to listen—on a trip, pause often for children to think how to describe sounds heard—have students close eyes and raise a finger for each different sound heard.

Listen to nature, adventure, or historical stories in the out-of-doors.

Weave sounds into stories. Technique: Let each child or a small group select one source (animal, vehicle, etc.) and imitate its sound each time it is mentioned in a story. (The story may be real or created.)

Concept-New words are learned through involvement and ideas.

(activities)
See likenesses and differences of shapes, colors, and sizes.

Use references for comparisons and identifications.

Record new words.

Writing words in the sand, snow, or moist earth.

List and use adjectives for describing appearances.

Learn words to describe sound.

Keep a card file of new words defined and in alphabetical order.

Make one sentence descriptions.

Concept-Information gained should be organized.

(activities)
Use informative clues—example—Have each group of students write down four or five statements giving information about the object or animal. Have statements one at a time read. Write down or give a guess after each clue.

Identify animal homes during a nature walk.

Identify and describe animal tracks.

Organize sense impressions: Example—Game of We Saw, We Heard, We Felt, We Taste, and We Smell in telling about something in the outdoors.

Write descriptive labels for a nature trail.

Use children as living labels to mark trails.

Language Arts (cont.)

Blinding and Describing Game--Blindfold each student, give each one an object to describe. Have the group identify from clues given by each person.

Concept-Ideas formed by listening, speaking, reading, and writing may be stimulated by experiences out-of-doors.

(activities)
Writing one-sentence descriptions

Composing rhymes (rope-skipping, counting, etc.)

Writing tall tales and stories

Writing and reading poems

Make a personal record. Example--Copy names, colors, and sketch different flowers. Keep in a book. Other things may be used in the same manner.

Dramatizations-
Dramatize actions observed outdoors.
Work with puppet heads.
Describe different shapes of sticks to class or group.

Concept-Involvement brings awareness and understanding.

(activities)
Conduct group discussions. Hold small group discussions about some outdoor observation or experience.

Evaluate an activity.
    Define and describe.
    Identify important parts.
    Present various points of view or the value of the activity.
    Extend the understandings that have been gained.
    Express conclusions systematically.

Handle social introductions

Introduce speakers.

Comment on the progress of others and events.

Language Arts (cont.)

Follow-up for - Language Arts

Make a chart of the new words learned out-of-doors.

Use the words in reports, stories, and poems.

Make a card file of the new words, defined and in alphabetical order.

Print labels for signs and charts.

Draw a picture of a tree--list as many adjectives as possible about the tree (any object might be used).

Write letters telling about the field trips.

Social Studies

General Objectives:

A. To create an interest in and understanding of local history

B. To create an understanding of the relationship between man and his environment.

Concept-Maps show shape and size.

(Activities)

Make a rough sketch map of the school grounds or part of the grounds.

Make a rough map of several of the blocks surrounding the school. Indicate by means of symbols the outstanding features of the area. (Are there any points of historical significance? Where did the old school building or the original portion of the present one stand? Which are the oldest houses in the area?)

Sketch a map of the school grounds to show areas that are similar to forests, prairies, arid land, cultivated land, moist lands, and other special regions.

Concept-Man lives in his environment.

(activities)

Study topsoil, What is topsoil composed of? How thick is it in an undisturbed area near the school? If it takes 300 years to make an inch of topsoil, what has gone on in this spot since the first soil was formed?

Judge an area as a "Pioneer homesite." Think of the advantages--and disadvantages of the area. Use a pioneer checklist, including food, ink, dyes availability.

Dramatize Pioneer problems.

Concept-Time is relative.

(activities)
Collect historical information about the community.

Study a tree stump record--when cut, age by rings, how old the children were in comparison to the tree, etc.

Concept-Man relates to his environment.

(activities)
Note the influence of environment on people's way of life.

Observe the relation of a farm to the economy of an area.

Study places of interest in relation to community life--Indian mounds, an old cemetery, Fort Nashboro, Traveler's Rest.

Investigate the economic effects of storm damage.

Discuss precautions against storm dangers.

Study water sources. (rivers, streams, springs, pumps, river, resevoir)

Prepare and use flour. (See page 65 in Curriculum Enrichment Outdoors)

Compare insect activities with human occupations. (diggers of tunnels; corn borers, bark beetles and utility workers: fireflies and masons: mud-daubers and paper makers: hornets, paper wasps, etc.

Compare man's inventions with nature's devices.

Find evidences of how man has affected his environment.

Obtain old tools and discuss and demonstrate how man used them.

Observe old buildings and tell how they might have been built.

Take a walk in the neighborhood. Discuss wires underground and above. Discuss objects along the way. An excellent reference is Young Scientist Takes a Walk by George Barr.

Visit a sewage plant.

Have an outdoor pageant about a local historical event.

Find and study Indian relics and articles. Visit the mounds of the early Indians of Nashville.

Follow-up for Social Studies

Draw maps of the area as it might have been before the school was there, when the pioneers were there, and when early man might have been there.

Make a model of early houses that might have been in the area.

Make a model of a stone grave. Show how the Indians lived then.

Make a chart showing how man came to this area--show some of the things each type did.

Draw a chart showing what is under the street--where the lines come from and where they go.

Make a model house showing all the lines and pipes and where they go.

Draw a map showing nearby areas and buildings that help the school and home (fire house, power plant, storm drains, etc.)

Have an "old timer" come to visit and tell about "early days" and write about what he tells.

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Picture Book of Astronomy, Jeromi S. Meyer

Plants in the City, Herman and Nina Schneider

Rocks and Minerals, Robert Irving and Alfred Knopf

Rocks, Rivers, and the Changing Earth, Herman and Nina Schneider

Science in the Garden, Rebecca B. Marcus

See Through the Forest, Millicent Selsam

Teaching in the Outdoors, Donald R. and William Hammerman

The First Book of Conservation, F. [illegible]

The First Book of Weeds, Barbara L. [illegible]

The How and Why Wonder Books, Geoffrey Cos

The Land We Live On, Carroll Lane and Mildred Adams Fenton

The Moon and a Star and Other Poems, Myra Cohn Livingston

The Tribes That Slumber: Indians of the Tennessee Region, Lewis and Madeline Kneberg

The World We Live In, Life Special Editions for Young Readers

Trail Planning and Layout, Byron L. Ashbaugh

Trees, Birds, Leaves, Wild Flowers, etc., Golden Nature Guide Press Series

Trees of the Countryside, Margaret McKinney

Up the Windy Hill, Aileen Fisher

Weather Forecasting as a Hobby, Robert Wells

What Tree Is It? Anna Pistoruis

FILMS: See list following section on Grades 1 and 2

OUTDOOR EDUCATION
FOR
GRADE FOUR

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OUTDOOR EDUCATION
FOR
GRADE FOUR

Language Arts

General Objectives:

A. To help children develop use of sensory organs, such as hearing, touching, smelling, tasting, and observing.

B. To increase the ability of each pupil to express himself well in both written and spoken word.

C. To create an appreciation of the aesthetic value of the outdoors.

D. To develop creativity and dramatics centered around the outdoors.

Concept-Creative expression can be stimulated by outdoor experiences.

(activities)
Have children listen to the sounds around them.

Discuss the sounds heard.

Let pupils imitate sounds heard, especially those not recognized.

Lead the pupils into using original word combinations and to an interest in creating various word pictures.

Help children make a list of all the sounds heard and their source during an outdoor experience. Let the list be the basis for a story.

Encourage children to recognize likeness and differences.

Help to imprint a new word in the child's mind by writing the word immediately in the soil, or sand or snow with a stick or the finger.

Make a list of all types of sounds heard, such as rustle, buzz, rumble. Ask the child for suggestions of words to describe each of these sounds, such as faint (rustle, insistent (buzz), and low-pitched (rumble).

Encourage the use of words such as faint, rustle in recording the sights and sounds of the day.

(activities)
List five or six adjectives that might apply to objects-

a. seen
b. heard
c. smelled
d. felt
e. tasted

Make a combined list of the objects to which each adjective might be applied.
Example:

a. soft--moss, dandelion "parachutes," fog, piles of clouds, steps of an ant

Language Arts (cont.)

b. rough--elm bark, gravel road, wind, chatter of a squirrel
c. sharp--word, smoke, pointed glass, blue jay's scream, locust tree, thorn

Encourage the children to listen for new words in the speech of other people.

Keep a class card dictionary of new vocabulary learned in connection with outdoor experiences.
  a. Define each word
  b. Illustrate each word
  c. Alphabetize words

Watch for opportunities to emphasize objects or events that will contribute to the enrichment or word meanings.
  a. Write up a fictisious diary of a person who might have--lived in an old house, traveled an old road, or played in the woods.
  b. Dramatize stories about life in the woods.
  c. Have the children compose the ending for an unfinished story about the out-of-doors

Write or tell a story of life in a pond from the frog's point of view.

References:

Adler, Irving. The Sun and Its Family, New York. The John Day Co., 1958

Adelson, Leone, All Ready for Summer, Eau Claire, Wisconsin, E. M. Hale and Co., 1961

Britannica Junior, editor, Animal and Plant Life Study Guide, Chicago: Encyclopedia Britannica, 1957

Doane, Pelagie, A Book of Nature, New York: Oxford University Press, 1922

Fletcher, Helen Jill, The Nature Book, New York: Paxton Slade Publishing Corp., 1954

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Jensen, David Charles, My Hobby is Collecting Rocks and Minerals, New York: Hart Book Co., Inc., 1955

Jensen, Amy Elizabeth. Mushrooms, Ferns and Mosses, New York: Wonder Books, 1965

Mathewson, Robert, The How and Why Wonder Book of Reptiles, New York: Wonder Books Inc., 1960

Miner, Frances M. The Adventure Book of Growing Plants, New York: Capitol Publishing Co., Inc., 1959

Reed, W. Maxwell, Patterns in the Sky: The Story of the Constellations, New York: William Morrow and Co., 1951

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Rood, Ronald N., Butterflies and Moths, New York: Wonder Books Inc., 1960

Rood, Ronald N., Insects, New York: Wonder Books Inc., 1960.

Perry, John and Jane Greverus, Exploring the Forest, New York: McGraw-Hill Book Co., Inc., 1962

Peterson, Willis and Jeffrey Church, Nature's Lumberjacks, New York: David-Stewart Publishing Co., 1961

Tannenbaum, Harold E. and Nathan Stillman, We Read About Sounds and How They Are Made, St. Louis: Webster Publishing Co., 1960

Wilson, Ruth, Outdoor Wonderland, New York: Lothrop, Lee, and Shepard Co., Inc. 1961

Mathematics

General Objectives:

A. To use standard measuring instruments (compass, ruler, tape, gallon, body measure, etc.)
B. To understand the relationship of arithmetic to everyday living
C. To develop a capacity to estimate distance, time, quantity, space, etc.
D. To apply arithmetic skills to first-hand experiences in the out-of-doors.

Concept--Measurement is everywhere.

(activities)

Cutting and piling a cord of wood--what is a board foot?

Age of tree by ring count

Circumference and diameter of trees by use of the Baltimore stick and the Merritt Rule. Both instruments may be constructed easily in the classroom. Construction and use are explained fully in Teaching in the Outdoors by Hammerman on pages 41 and 42.

Dimensions of camp buildings, school building

Distance in hiking, by pacing

Percent of slope by use of a clinometer. The clinometer may be constructed in class to use in measuring angles in a vertical plane--that is commonly, angles measured between the horizontal and the position of some point above or below the level of the observer. Construction is explained and illustrated in Curriculum Enrichment Outdoors by Hug and Wilson on pages 85 and 196. It may be noted that the construction of the clinometer is very much like the astrolobe which is used to measure the angle of starts. This construction is explained in the section on astronomy. Perhaps one instrument could be used for both purposes.

Make a surveyor's level: fasten an ordinary level to one end of a board on inch thick, two inches wide, and perhaps four or five feet long. A wooden level can be fastened with corner braces. The total length of the board and the level when assembled should be determined by the size of those who will use the instrument. Construction is illustrated in Curriculum Enrichment Outdoors on page 195.

Make an astrolobe to measure the angle of stars in the sky.

Explore the origin of measures and dramatize some of these origins. (Hug and Wilson, page 73)

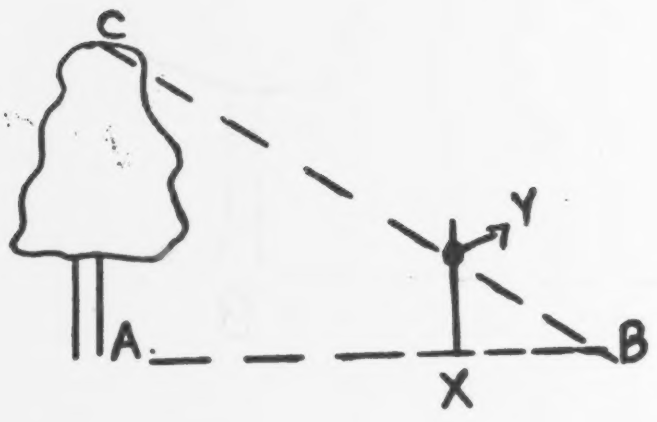
Use the "Personal" Standard of measure. Personal measurements taken in the classroom by children working in pairs can be useful in many ways outdoors. Children can use such measurements often in judging heights and sizes outdoors. Example: the length from the nose to the end of an outstretched hand was originally the yard measure. Useful measurements are listed in Hug and Wilson on pages 72-73.

Estimating:
Height of a tree or of a building can be estimated in several ways--

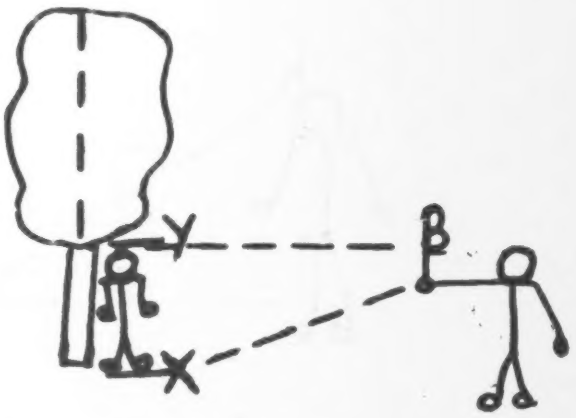
1) Inch to Foot- Starting from the tree(A), walk 11 steps or measure 11 units and mark the end point (X) with a long perpendicular stick; then measure one unit more and mark that point (B). Sight from point (B) across the stick to the top of the tree. Mark on the stick the point where your line of vision intersects the stick (Y). Measure the distance from point (X) to point (Y) in inches. This will be the height of the tree, in feet.

2) Pencil Method- Have a friend of known height stand beside the tree. Stand at a distance from him and hold a pencil or short stick at arms length and sight across the top of it to point (Y). Slide your thumb up or down on the stick until you are able to sight across the top of the thumb (B) to point (X). Keep your thumb here the remainder of the method. Move the pencil upward until you can sight across the top of your thumb to point (Y). Now sight across the top of your stick to a new point on the tree. Repeat this until you have reached the top, keeping track of the number of measurement (XY) you have gotten. The height of the tree is this number times the known height of the person acting as a measurement.

Inch to Foot Method:



Pencil Method:

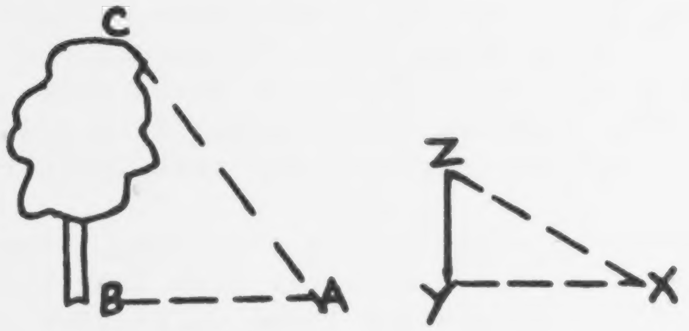


3)Shadow-Ratio Method- Measure the length of the tree's shadow (BA). Place a stick in a perpendicular position from the ground and measure its shadow. Both should be on the same slope. In the two similar triangles (CBA) and (ZYX) you now know two sides of the smaller and one side of the larger so a problem can be made::CB/ZY = BA/YX or $\frac{ZY \times BA}{YX}$

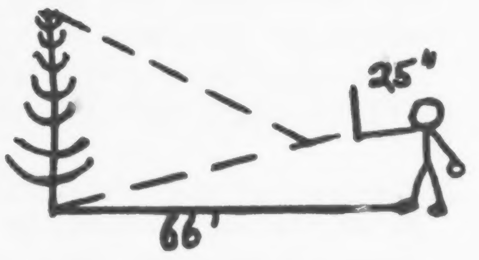
4)Biltmore Method- Glue a strip of hard paper or cardboard on one side of a yardstick. Begin at one end and make marks 6.15 inches apart and number them 1, 2, etc. Stand 66 feet from the tree, hold arm out horizontally and the stick vertically at 25" from eye. Slide the stick up or down until the top of the stick is in line with the top of the tree. Without moving the head, sight to the bottom of the tree and see the place on the stick where the line of sight crosses it. Each number means a 16 feet length.

5)Muddy Water Method- Place a basin of muddy water on the ground, between you and the tree. Step back from the basin a distance equal to that from your eyes to the ground. You should see the top of the tree reflected in the water. If not, move the basin back until this is possible. The distance from the basin to the foot of the tree is the height.
When AC = hc then BH = AB

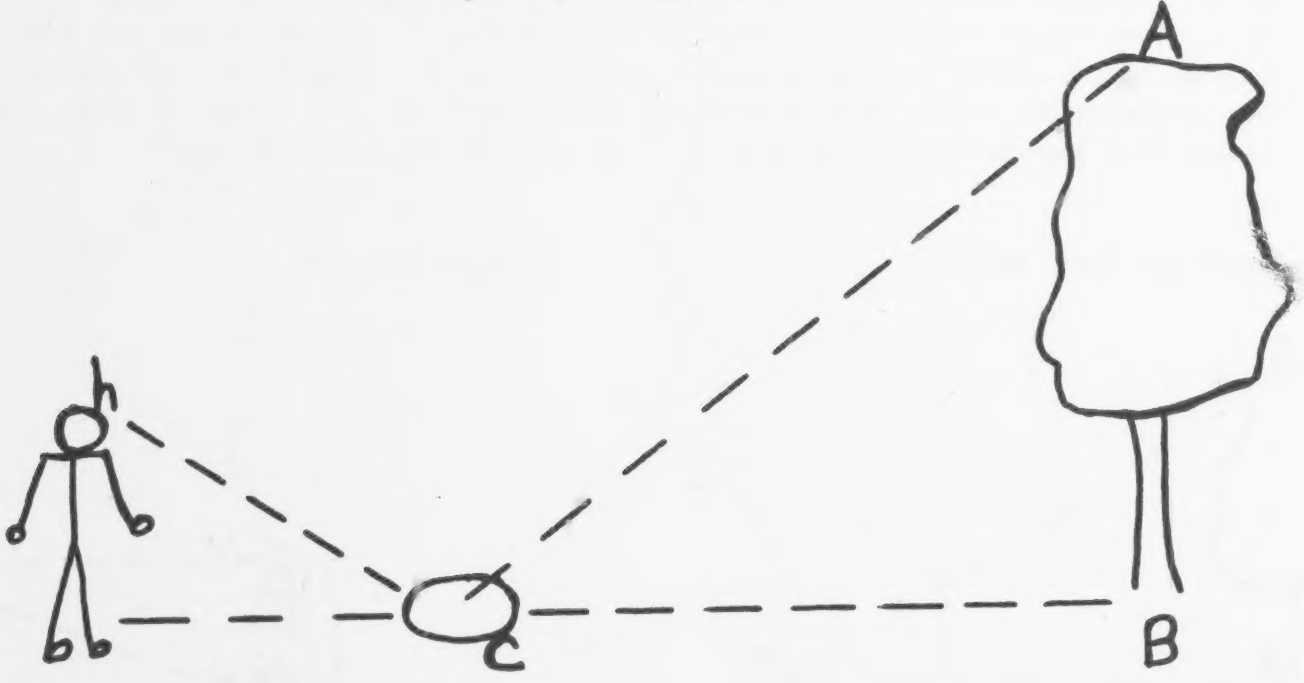
Shadow-Ratio Method:



Biltmore Method:



Muddy Water Method:



Mathematics (cont.)

Compare shapes of shadows.

Observe how shadows fall according to the position of the sun.

Comparison can be made among objects as to height, size, and distance.
Get the height of trees by ratio of shadow in relation to the height of a known object and its shadow.
Determine the ratio of number of members of one set to those in a smaller or larger set.
Compare the size of shrubs generally with the size of trees.
Compare trees as to leaves, trunk, height, shape and color.

Concept-Graphs are a useful way to record information.

(activities)
Make tables, charts, or graphs of the data collected in projects.

Graph temperature changes.

Graph star positions with Stellar Position Chart.

Concept-Many natural objects are geometric shapes.

(activities)
Find and name geometric shapes in an area. Draw pictures using these shapes as a basis.

Concept-Maps tell in picture stories the location of places and things.

(activities)
Make a transit.

Learn to use a compass.

Make a map of the school yard.

Determine direction from your school yard--from your classroom.

Make a map of your community.

Lay a compass trail.

References:

Harding, Lowry W., Arithmetic for Child Development

Pattison, Going Places Series, How Far? Which Way? Where? Rand McNally & Co.

Mathematics (cont.)

Tannenbaum, Map-Making, Science Book Laboratory

Walch and Cordell, Colorful Teaching of Mathematics, J. Wenston Walch Publisher, Box 1075 Portland, Maine.

Model Weather Station Kit. Models of Industry, Inc.

Competative Compass Game, Silva Inc., LaPorte, Indiana, Catalogue #1133.

Social Studies

General Objectives:

A. To create an interest in the environment in which we live.
B. To teach children respect for work, appreciation for their heritage and of the problems of their ancestors. Also, to teach responsible attitudes toward natural resources.
C. To develop an understanding of democratic procedures and of group processes.
D. To develop an understanding of how a local government functions.
E. To develop good social relationships.

Concept--Man must live in his environment.

(activities)

Visit local spots of historical interest.

Dramatize events.

Map and model making

Find evidences of how natural environment has affected man.

Explore for artifacts which provide clues of how the people lived.

Close eyes and determine what an object is by using the senses other than seeing.

By observing old buildings, figure out how they were constructed.

Take a walk in the neighborhood. Find out how many useful and important functions a city street performs.

Looking for Indian relics

Make a community study of some small community nearby.

Put on a pageant about a local historical event.

Conduct group discussions.

Interview people in the community.

Indicate features on a map.

Use a compass in mapping streets.

Social Studies (cont.)

Observe the relation of a farm to the economy of an area.

Investigate the economic effects of storm damage.

Take precautions against storm dangers.

Study water sources.

Compare insect activities with human occupations.

Promote good outdoor manners and cooperation.

References:

Barr, George, Young Scientist Takes a Walk, McGraw Hill Book Co., 1959.

Editorial Staff of Life and Lincoln Barnett, The World We Live In, New York, Simon and Schuster, 1956.

Elliott, Lizzie P., Early History of Nashville, Board of Education, Nashville.

Hug, John W. and Wilson, Phyliss J., Curriculum Enrichment Outdoors, Harper and Row, Publishers, 1965.

McFall, Christie, Maps Mean Adventure, New York, Dodd Mead and Co., 1961.

The Tree and the Trail, Holling and Holling, Mifflin Company, Boston, 1951.

Holling and Holling, Men of the Mississippi, Houghton Mifflin Co., Boston, 1951.

Science

Objectives:
A. To be able to recognize some of the common plants and animals in the area.
B. To understand the inter-relationship of plant and animal life.
C. To understand the need for conservation.

Concept-Plants live and grow.

(activities)
Plant Life:
Observe characteristics of plant life.
Observe conditions necessary for growth of plants.
Plan for conservation of plant life.

1) Collect a large variety of leaves to examine their parts, structure, and similarities and differences. Press leaves between papers with weights to dry them and keep them from curling up.

2) Make a collection of leaf prints. Place a leaf wrong side up on some newspaper. Coat the veiny side with vaseline lightly, then cover the leaf with a sheet of fresh typewriter carbon paper. Place

Science (cont.)

a sheet of white paper over the leaf and rub the side of a round pencil or towel back and forth several times over the paper. The leaf will pick up a coating of the carbon paper. Place the leaf down between two fresh sheets of white paper and rub the top sheet of paper.

3)Grow a potato plant in a shallow dish of water.

Sketch tree shapes (silhouettes).

Study bark patterns, textures, colors.

Find root systems (exposed by erosion).

Compare deciduous and coniferous tree characteristics.

Compare fruits, seeds, buds, leaf scars, leaves.

Figure the method used in cutting and reasons for cutting while examining a tree stump.

Rub with pencil or crayon on paper to get an impression (tracing) of the growth rings. (stumps)

Find decay and insect evidence. (stumps)

Find effects of people, animals, sunlight, shade, wind, water, etc. on plant growth.

Find locations where plants grow (cracks in sidewalks, school buildings, tree stumps, etc.).

Taste wild onions.

Find effects of plants on erosion and erosion on plants.

Rub plant pigments on sandpaper.

Keep records of the heights of small plants with strips of colored paper by gluing the strips to a piece of cardboard to make a growth graph.

Study the roots of grass or other plants by carefully washing away the soil.

Compare how seeds travel from place to place.

Also, see activities and follow-up for Science under Grade Three section.

References:

Blough, Glenn O., Plants Round the Year, New York, Harper, 1959.

Science (cont.)

Buck, Margaret Waring, In Ponds and Streams, Nashville, Tenn., Abingdon, 1955.

Cormack, Maribelle B., The First Book of Trees, New York, Watts, 1951.

Jauss, Anne Marie, Our Friend, the Forest, A Conservation Story, New York, Watts, 1951.

Miner, Irene O., The True Book of Plants We Know, Chicago: Children, 1953.

Concept-Some living things move.

(activities)
Note the different types of animal life and observe some members of each group on your outdoor trips.

Compare the different ways animals and birds move.

Study animal tracks to see how animals move.

Activities for study of animal life:

Collect animals--visit a pond in the out-of-doors. Fill several jars with water. In room temperature, open jars and let them be exposed to sunlight. After two or three days, obtain a drop of water with the medicine dropper and place it on a slide; over this place a cover slip. Examine with a microscope.

Collect and observe earthworms.

Collecting insects--to collect flying or jumping insects you will need a net. (This can be made from materials brought from the home.) Insects can be found in practically every habitat. Insects should be placed in "killing jar" and brought back into the classroom for mounting.

Observe birds. (See "Observing Birds" activities for Grade Three, p. 18)

Build a bird feeding station.

**See activities and follow-up on Animal Life as described in the Science section for Grade Three:
Concept- Insects are animals with six legs. (p. 19)
Concept- Animals live and grow. (p. 20)

References:

Cruikshank, Allan and Helen Cruikshank, 1001 Questions Answered About Birds, New York: Dodd, 1958.

Darby, Gene, What Is a Frog? Chicago: Benefie, 1957.

Fabre, J. Henri, Insect Adventures, New York: Dodd, 1958.

Goudey, Alice, Here Come the Bees, New York: Scicknes, 1960.

Science (cont.)

Kieran, John, An Introduction to Birds, New York: Doubleday, 1950.

Podendorf, Illa, The True Book of Animal Homes, Chicago: Childrens, 1960.

Concept-Rocks are formed in many ways.

(activities)
Identify rocks.

Study the types of rocks: a)igneous, b)sedimentary and c)metamorphic

Collect samples of different kinds of rocks in the community. Divide them into groups according to similarities of color, shape, material, etc. Use a handbook for identification of the rock.

Test for limestone. Using a medicine dropper, allow some vinegar or lemon juice to fall on a piece of limestone. Bubbling on the surface of the rock will occur. The limestone is made of calcium carbonate, which reacts with the acid vinegar or lemon juice to form carbon dioxide gas.

Formation of layers by the settlement of sediments: Place pebbles or small stones in a quart jar. These should be collected on a field trip to a pond, lake, or beach. Fill the jar 1/3 to 1/2 full. Add water until the jar is almost full. Screw the cap on tightly and shake vigorously. Put the jar down and allow the materials to settle to the bottom; first the heavier, coarser materials will settle to the bottom, and the lighter, finer particles will form a layer on top.

On a field trip around the school grounds, have children collect rocks of assorted size and description. Break into small groups, blindfold each pupil and give each one a rock they collected. Have each child give a description of the rock they have. See if they can identify the rock.

Concept-Minerals are the bricks of which the earth is made.

(activities)
Identify minerals by the:
color test, crystaline test, and hardness test

Classify minerals as:
metals, non-metals, and fuels

Study uses of minerals:
for plants, for animals, and for economy of man

Make a list of all of the things we use from petroleum products.

Show by attempting to grow a plant in the absence of soil,which contains minerals and growing a plant in rich mineral soil.

Let water evaporate in a dish and observe the crystals formed.

2

Science (cont.)

Concept-Soil is made up of many things.

(activities)
What is soil?

How is soil formed?

Study the uses of soil.

Learn about soil conservation.

Obtain soil samples from a moist area and a dry area, and with the senses analyze the two samples.

Show examples of soil erosion within the school environment.

Obtain samples of two different kinds of soil, place each in a separate jar of water and observe the specific gravity of each.

Follow-up for - Rocks, Minerals and Soil

Make a chart of the different kinds of rocks in this area.

Draw a picture showing how we use rocks.

Use tumbled rocks to make key rings, jewelry (findings on Mobile Unit).

Use different kinds of rocks to "paint" a picture on sandpaper.

Investigate minerals in the soil by pouring a mixture of soil and water through a filter. Put the water aside in a glass pie pan. Look at it when the water evaporates. The materials left in the pie pan is the mineral in the soil.

Get sand, garden soil, and humus soil; make holes in three coffee cans; put the cans on top of a jar; put a cupful of soil in each can; pour a cupful of water in each can; watch to see which soil holds the water the longest. Why? Time how long it takes the water to run through each kind of soil.

References:

Victor, Edward, Science for the Elementary School, MacMillan Co., New York, 1965.

Gates, Richard, The True Book of Conservation, Chicago: Childrens, 1959.

Harland, W. B., The Earth: Rocks, Minerals, and Fossils, New York: Watts, 1960.

Parker, Bertha M., The Earth's Changing Surface, New York: Harper, 1958.

Silsam, Millicent E., Birth of an Island, New York: Harper, 1959.

Mathematics (cont.)

Time of Day:
Telling time by the sun

Make a sun dial. This activity is explained and illustrated in Arithmetic for Child Development by Lowry W. Harding.

Use a watch as a compass.

Relate shadows to seasons.

Estimate the number in a set:
This is explained more fully in Hug and Wilson on page 88.

Concept-An average is used with a set of unequal values.

(activities)
Average temperature readings.

Check pace at a 100 ft. distance; find the average after five trials.

Find the average annual growth of a tree each year by measuring each tree ring.

Use crickets as "thermometers." If the day's temperature is between 55 and 100, a cricket can help the children to estimate the temperature with reasonable accuracy. To determine the number of degrees of temperature, the children should count the number of times the cricket chirps in 15 seconds and then add 40. Before doing any figuring, see if the class can tell whether the chirping will be faster or slower in hot weather than in cooler weather. Also ask the children to try to write the simple formula for finding the number of degrees of temperature (T), when the number of cricket chirps is represented by (C). ($T=C+40$)

Concept-A compass shows direction. (See Teaching in the Outdoors, Hammerman, p.38)

(activities)
Learn the parts of the Silva Compass.

Organize a "Destination Unknown" hike.

Secure the Competative Compass Game from Silva Inc., LaPorte, Indiana, (Catalogue #1133) for 25¢. The game calls for the setting up of a compass course and requires measuring the individual pace of each child. This is a very worthwhile activity.

Concept-Shadows come from light.

(activities)
Estimate the length of a shadow in relation to the object casting it.

Mark the position of the shadow on the ground with chalk or sticks.
(Note the change in length and position after a few minutes and hours.)
What causes the shadow to move?

Compare the shadows cast by the flag pole, posts, trees, persons, buildings,etc.

Science (cont.)

Concept-Weather affects the life, growth, and development of all living things.

(activities)
Vocabulary study:
1)air masses, 2)weather fronts, 3)hurricane, 4)tornadoes, 5)thunderstorms

Predicting the weather:
1)measuring air pressure, 2)measuring wind direction and speed, and 3)measuring relative humidity

Learning activities for studying weather:
Examine weather maps
Make a day-to-day weather forecast
Make a weather vane
Make a rain gauge
Set up a weather station

Compare cloud formations.

Find wind speed with wind measurer (card and thread) and flag movement.

Find wind direction with balloons and bird feather vane.

Compare effects of objects (such as buildings or vegetation) on wind.

Explore little climates (differneces in temperature in different places on the school ground).

See the effect of rain on soil erosion (set up splash boards and water soil with a watering can).

References:

Antoine, Tex, Wonders of the Weather, New York: Dodd, 1962.

Bonsall, George, The How and Why Book of Weather, New York: Grosset, 1960.

Gibson, Gertrude H., About Our Weather, Chicago: Childrens, 1960.

Hitte, Kathryn, Hurricanes, Tornadoes, and Blizzards, New York: Random, 1960.

Schrreider, Herman, Everyday Weather and How it Works, New York: McGraw, 1961.

Concept-Man must preserve his natural environment both for today and the future.

Objectives: to teach the appreciation of the out-of-doors and to show the plan of nature through a "web of life."

(activities)
Make a compose pile to have rich dirt for spring planting. Take flowers, etc. out and bury so it can enrich the soil.

Divide the school grounds into areas for each room. This will be their responsibility to keep clean and to improve with conservation measures if needed.

Science (cont.)

Talk about conserving water.

What are natural resources?

Conserve natural plant life. What is the value of plants?

Why are natural resources important to man?

Teach the "web of life" idea with the films, "The World at Your Feet," and "The Web of Life."

Discuss the use of animals under the ground.

How is soil made?

Find root systems exposed by erosion.

Test bark thickness.

Rubbing with pencil or crayon on paper to get an impression (tracing) of growth rings of a stump.

Study the roots of grass or other plants by carefully washing away the soil.

Compare how seeds travel from place to place. Look around to see if you can determine where a seed for a new plant might have come from.

Follow-up for - Conservation

Make a display showing how water will run down a slope not planted and will not run on one that is planted.

Make a display case of earth, showing earthworms at work.

Make a chart showing soil in layers (glue to board). Use corer to get soil sample (Mobile Unit).

Make a chart of soil samples from around the school. Show which is the best.

Set up a bee hive in the window; watch the bees (Mobile Unit).

Make a chart with pictures showing how wind, rain and sand can wear down an area.

References:

Ashbaugh, Byron L., Trail Planning and Layout.

MacMillan, Dorothy Lou, School Camping and Outdoor Education.

Stapp, William B., Integrating Conservation and Outdoor Education into the Curriculum.

Gates, The True Book of Conservation.

Hamm and Nason, An Ecological Approach to Conservation, 1964.

Science (cont.)

Concept-There is something more than the earth.

(activities)
Draw pictures and star maps of constellations so that you will be able to recognize them in the sky. Find the Constellations, pp. 18-19, 22-23

Take a star hike. Learn some of the constellations, such as the Big Dipper, Orion, and Cassiopeia. Another valuable learning experience is finding out how to locate the North Star, using the "pointers" in the Big Dipper. Point out the constellations by the help of a flashlight focused in a narrow beam. Scout Field Book, p. 360

Read stories about the constellations. Star Legends by Clark Wissler

Compose stories about the stars. Let the children make up these stories using their own backgrounds and experiences in their accounts.

Make a star map of the important constellations. 700 Science Experiments for Everyone, p. 68

Make a constellation flash card set; use as a game.

Visit the planetarium at the Children's Museum.

Make a cardboard planetarium. See Stepping Stones to Nature by R. O. Bale, p. 25.

Make star trails using a camera. 700 Experiments for Everyone, p. 68.

Make a papier-mache heaven. See Bale, p. 26.

Make a blue print of the stars. See Bale, p. 27.

Learn how to read the star clock. Bale, p. 16-17.

Learn to plot star positions on a stellar position chart. 700 Experiments for Everyone, p. 68.

Be able to recognize what stars appear when and in what seasons. Scout Book, pp. 355-356

Make a cardboard astrolobe for measuring the angle of stars. The World Book Encyclopedia, p. 674 (Also see Navigation and Sextant)

Follow-up for - There is something more than the earth.

Make a planetarium (Direction from ODE office).

Make a chart with star patterns on it.

Make up a story about a star pattern.

Make a papier-mache heaven (Directions from ODE office).

Draw pictures of a star legend.

Science (cont.)

Use flash cards to learn star patterns. (Mobile Unit)

Make a scrapbook of star patterns.

References:

A Beginner's Star Book, K. McReady (G. P. Putnam's Sons).
Excellent introduction to the wonders of the heavens.

A Dipper Full of Stars, Lou Williams (Follett Publishing Company).

Discover the Stars, Gaylord Johnson (Leisure League).
Studying stars, the project method.

Find the Constellations, H. A. Rey (Houghton Mifflin Company).

Neighbors in Space, W. B. White (Rand McNally)

Star Legends by Clark Wissler.

Scout Field Book, James E. West and William Hillcourt.

700 Science Experiments for Everyone, compiled by Unesco (Doubleday and Co.).

Starcraft, W. H. Barton and J. M. Joseph (Whittlesey House).
A novel method of finding the constellations.

Step[illegible] Stones to Nature, R. O. Bale (Burgess Company).

Teaching in the Outdoors, Hammerman and Hammerman (Burgess Publishing Co.).

Concept--A compass shows direction.

(activities)

Learn what the compass is and how to use it. (See Scout Field Book, pp. 37-40)

Learn how to orientate your map. This means nothing more than lining up your map so that north on your map is pointing to the same north as in the field. (Scout Field Book, pp. 56-58)

Learn about the scale of miles. This is usually located at the bottom of the map. (See Good Times with Maps, p. 15)

Know the directional signs, N-S-E-W.

Notice the map legend on each map (map symbol).

Use your compass to go on a treasure hunt--all messages giving distances and compass directions.

Use the compass to go on a "Destination Unknown Hike." Scout Field Book

Learn how to measure paces. Science Book-Lab Map-Making, p. 18.

Learn how to find distances on a map. Tannenbaum, p. 21.

Science (cont.)

Make a map of your school room, school grounds, or community. Tannenbaum, p.24

Learn how to measure angles using a protractor and a transit. Tannenbaum, pp. 28-34.

Follow-up for - A compass shows direction.

Make a "salt" map of the school area, showing contours etc.

Draw a map of "your" house, pace off the distance.

Make a chart showing contours around the school.

Make a chart showing all types of maps.

Make a chart showing map symbols.

Make a display of old maps.

References:

Camping and Outdoor Fun, Major Mauno A. Lindholm, Hart Publishing Company.

Good Times With Maps, Irene Estap (Belmont Publishing Company).

Hiking, Boy Scouts of America.

Science Book Lab Map-Making, Harold E. Tannenbaum and Nathan Stillman, (Science Materials Center, Inc.).

Scout Field Book, James E. West and William Hillcourt, Boy Scouts of America.

Teaching in the Outdoors, Donald R. Hammerman and William M. Hammerman, (Burgess Publishing Company).

Arts, Crafts, and Music

Objectives:
A. To develop an appreciation for arts, crafts, and music.
B. To show relationship of art and music to cultures of different people.
C. To encourage group singing for fun and relaxation.
D. To emphasize the importance of rhythm.
E. To consider art and music as a part of everyday living.
F. To encourage expression in imaginative and realistic ideas.
G. To develop interests which will lead to profitable use of leisure time.
H. To develop skills with common tools.

(activities)
Arts:
Find lines in the environment-
  a)circle - sun, moon, berry, etc.
  b)zig-zag - tree rings, edges of leaves
  c)wavy - path of a brook, soil
  d)straight - tree trunk, vein in a leaf, a pine needle, blade of grass
  e)finding other shapes in the environment

Arts, Crafts, and Music (cont.)

Find design in movement-
- a) Draw lines to show how different birds fly.
- b) Draw lines to show how branches weave in the wind.
- c) Draw lines to show how clouds move in the sky.

Find design in sound-
- a) Draw a sound the way it might be put down on paper. Use dots, light lines, dark lines, zig-zags, spirals, straight and wary lines. (wind in grass and trees, squirrel's sound, dog's bark)

Find design in color- Use rocks, sticks, leaves, etc. to rub on sandpaper to see the color.

Find design in texture- Draw and describe the following: bark of trees, stumps, blade of grass, sidewalk, feather.

Construct collages from natural materials such as cones, sheell, pebbles or twigs, leaves, etc.

Music:
Imitate bird calls.
Match tones.
Compost songs

Make and use drums, rattles, etc.
Use rhythmic patterns in jumping.
Do "Indian Dances."

Dramatize seed movements.

Crafts:
Make simple camp furnitures.
Make picture frames.
Wood carving

Make paints.
Prepare clay for modeling.
Make mobiles.

Collect a "natural alphabet."
Collect animal forms observed in wood.
Prepare a woodland terrarium.

Make grass baskets
Use acorn caps for miniatures.

Arts, Crafts, and Music (cont.)

References:

Drawing for Boys by Vaughan-Jackson, Pitman, 1956.

Arts from Scrap by Carl Reed and Joseph Orze. Davis Pub., Inc., 1960.

Let's Go To the Brook by Harriet E. Huntington, Doubleday, 1952.

The True Book of Sounds We Hear by Illa Podendorf, Children's Press, Chicago, 1955.

Nature Craft by Ellsworth Jeoger, MacMillan Co., New York, 1961.

Drawing Birds by Joy Postle, Pitman Pub. Corp., 1963.

Let's Whittle by W. B. Hunt, The Bruce Publishing Co., Milwaukee, 1962.

Sketching Out of Doors by Leonard Richmond, Pitman Pub., 1960.

How to Sketch, Pitman Pub. Corp., 1960.

Southern Nature Stories by W. B. Baker, Lucien Harris Jr., Wallace Rogers, Turner E. Smith & Co., 1946.

Sing a Song of Seasons, Sara and John Brewton, The MacMillan Company, New York, 1963. (Poem book)

Curriculum Enrichment Outdoors by John Hug and Phyllis Wilson, Harper and Row, 1965.

Nature Craft by Richard F. Dempewolff, Capitol Publishing Co., 1965.

Knifecraft by Nik Drevitsky, C. Howard Hunt Pen Co., 1954.

Drawing Sea and Sky by Victor Perard, Pitman Publishing Corp., 1957.

Naturecraft Creatures by Joseph W. Lippincott and G. J. Roberts, J. B. Lippincott Co., 1964.

Fun With Naturecraft by Avery Nagle and Joseph Leeming, J. B. Lippincott Co., 1964.

The Art of Driftwood and Dried Arrangements by Tatsuo Ishimoto, Crown Pub., Inc., 1953.

Easy Crafts by Ellsworth Jaeger, The MacMillan Co., 1947.

How To Do Nature Printing by David and Jean Villasenor, Published by Walter Foster.

Let's Find Out What's in the Sky, Martha and Charles Shapp, Franklin Watts, Inc., 1961

The Art of Origami, Samuel Randlett, E. P. Dulton and Co., Inc., 1961.

References

Books:

Barr, George, *Young Scientist Takes a Walk*, McGraw-Hill, Inc., 1959.

Forester, Joseph E., *Tree Sort Guide*, Crown Publishers, Inc.

Hammerman and Hammerman, *Teaching in the Outdoors*, Burgess Publishing, 1964.

Hug and Wilson, *Curriculum Enrichment Outdoors*, Harper and Row, 1965.

MacMillan, Dorothy Lou, *School Camping and Outdoor Education*, 1956.

West, *Sort Guide to the Eastern Land Birds*, Crown Pub., Inc.

Golden Adventure Kits by Capitol

Films: (Found in the Metro Film Library unless otherwise mentioned)

Plants-
Plant Life and the Soil FS200
Balance Among Living Things FS1323
How Do Plants Help Us? FS1788
How Green Plants Make and Use Food F672
The Parts of a Plant FS2490
Telling Trees Apart FS219
What is Soil FB1947
Man Cooperates with Nature
How Trees Grow

Weather-
How Weather Helps Us F988
How Weather is forecast F900

Water-
Air and Water FS2063
Finding Out about Land, Air and Water FS1777
How Does Water Get into the Air? FS1803
The Water Cycle F1192
Life in Ponds, Lakes, and Streams FS747
Water, Water, Everywhere: Observing Things About Us F1212

Animals-
Life Cycle of the Mosquito F63 F325
The Life Cycle of Insects FS2557
Finding Out About Things Around Us FS1779
Animals Change FS860 FS1506
Story of the Robin FS7932 FS1508
Birds are Interesting F164
Bird Homes F162 F163 F319
Birds of the Dooryard F191
Homes of Birds 37F
How Animals Get Air 35F
How the Birds Get Their Color 26F
Fish and Amphibians 45F
Fresh Water Turtles and Fish 66F

References (cont.)

Rocks, Minerals, and Soil-
How Nature Depends Soil 50F
How Soil is Formed 76F
Soil Conservation (Man Cooperates With Nature)
What is Soil? EBF, 1947
I Went to the Woods
Rocks and Minerals

Health and Physical Education-
Health and Safety 50F
The Water We Drink
Fitness: Rhythmic Activities 40F

Maps and Compass-
Let's Look at Maps FS1220
Maps and Their Meaning F354 F147
Language of Graphs F641
By Map and Compass, Silva Films, Crawley Films Ltd., Dept. of Conservation

Mathematics-
Base and Place F1947
Story of Weights and Measures F1171

Astronomy
Myths and Legends FS1432
Heroes of Greek Mythology FS1633 FS1638
Earth and It's Neighbors in Space 48F
The Sun's Family FS 57F
Finding Out About the Sky FS1778
Stars and Galaxies FS2238

OUTDOOR EDUCATION
FOR
GRADES FIVE AND SIX

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I Mathematics - objectives, concepts, activities, and follow-up
  a. How close can an estimate be?
  b. Measurement is everywhere.
  c. Rate and Ratio
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II Science - objectives, concepts, activities, and follow-up
  a. A plant is a living thing.
  b. An insect is an animal with six legs and three body parts.
  c. All birds are not the same.
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  e. Reptiles and amphibians are cold blooded animals with backbones.
  f. Conservation is everybody's responsibility.
  g. What is soil?
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V Arts, Crafts, and Music - objectives, concepts, activities, and follow-up
  a. Materials of Nature
  b. Music is everywhere.

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OUTDOOR EDUCATION
FOR
GRADES FIVE AND SIX

Mathematics

General Objectives:

A. To use standard measuring instruments.
B. To understand the relationship of arithmetic to everyday living.
C. To develop a capacity to estimate (time, quantity, distance).
D. To apply arithmetic skills to first-hand experiences in the outdoors.

Concept-An estimate is one method of measurement.

(activities)

Temperature- Cricket chirps plus 40 (Count number of chirps in 15 seconds and add 40 to determine the temperature.

Estimate the height of a tree
See pages 41 & 42 - Mathematics for Grade Four

How close is lightning? After lightning has flashed, count slowly 1001, 1002, etc. until thunder comes. The last number you have counted is the number of miles away the lightning has hit.

Measure how far away lightning is: Sound travels at 1110 feet per second. Light travels at 86,000 miles per second. Light reaches the eye almost instantly, thunder arrives after covering the intervening distance at a speed of 1110 feet every second. Example of method to be used: If there is an interval of five seconds between the flash of lightning and the sound of thunder, then the lightning is 5500 feet away (5 times 1100 feet).

Estimate the number of trees in an acre of land.

Estimate the distance from one point to another--Find a given distance both by pace and step--mark off 100 feet by having a child walk down and back (on [illegible]pe if possible). Add both way's results and take a average. Divide this into 100 to get the length of a step; two steps equal a pace. (It is easier to use a pace in walking off distances.)

Estimate and measure dimensions of a building and report on the percentage of error.

Estimate the number of board feet in a tree. (See page 335 in Programs in Outdoor Education by Freeberg)

Estimate distances (See page 341 in Programs in Outdoor Education, Freeberg)

Measure the width of a stream or river using the pace-angle method. (See Teaching in the Out-of-Doors, page 56, Hammerman)

Measure the width of a stream or river using the Napoleon method. (See Teaching in the Out-of-Doors, page 57, Hammerman)

Calculate the velocity of a river or stream current. (See Teaching in the Out-of-Doors, Hammerman, page 58)

Mathematics (cont.)

Concept-Measurement is everywhere.

(activities)
Make personal measurements: height to shoulder, height to waist, length of reach, pace, hand span from thumb to little finger, nose to length of outstretched hand, distance from tip of middle finger to tip of middle finger on other hand (arms outstretched), approximate height of person, length of head from top to chin, length of foot.

Develop a realistic concept of an acre. (See Teaching in the Out-of-Doors, Hammerman, p. 39)

Measur~~ing~~ surface areas to make a map. Make a measuring wheel. (Mobile Unit)

Measure tree rings and work out problems i.e. Count the rings to see how long the tree has lived. If it was cut in 1964, when did it start to grow? Look at the injury, or burn (depending on the stump) that shows up in the seventh ring from the last. In what year did the injury occur? How old was the tree? Compare this tree to other trees of this size. Take a core sample of different types of trees to study the rate of growth. (Mobile Unit)

Measure the perimeter of the school site.

Construct an astrolabe -- use to measure angle of slope.(Mobile Unit)

Mark off contour lines on a hillside and then make a contour map of the hill.

With a compass, walk the perimeter of an equilateral triangle and try to end up at the starting point. (compass game on Mobile Unit)

Make a shadow clock to tell the time of day and relate the shadows to compass directions. (See Stepping Stones to Nature by Bale)

Use a topographic map and measure a distance. Lay out a bee-line trail on the map.

Measure the circumference and diameter of a tree and compare the two.

Lay out an area or activity area for a game or sport.

Draw a scale plot for a school garden or use of school grounds.

Concept-Rate and Ratio are methods of comparison.

(activities)
Find a large ant running and measure the distance traveled in a short time. Measure the ant and find out how many of its body lengths are represented by distance traveled. Have children determine how far they would go if they traveled the same number of own body lengths in the same period of time. Figre the rate of speed (mph) this would represent.

$$\frac{\text{Ant's body length}}{\text{Distance ant traveled}} = \frac{\text{Student's body length}}{\text{Distance student traveled}}$$

Mathematics (cont.)

Figure the height of objects (telephone poles, trees) by the ratio of one shadow to another. Put stake in ground on same slope as tree or pole. Measure the shadow of the stake; measure the shadow of the tree or pole. Measure from end of shadow to bottom of stake and tree or pole. You now have two sides of a triangle on the tree and three sides on the stake. You can figure the height of the tree and figure the ratio of the stake's shadow to the tree's shadow.

Measure a tree shadow at different times of the day and get the ratio of the moving sun and shadow.

Fractions and whole numbers: Take a tree census (determining kinds of trees in a particular area). Talk about what fractional part of the total the red oaks were, etc.

Make a survey of different types and distributions of plants in a field. Make a circle of wire, throw a certain number of times, and see how many of a certain type of plants fall within the circle. (random sampling)

Find the cost of gravel needed for fixing the school road, or concrete for pouring a sidewalk nearby. (See Programs in Outdoor Education, Freeberg, p. 338)

Count the average number of trees in an acre.

Average temperature and barometric readings for a week.

Concept-Graphs and charts are useful methods of recording.

(activities)
Plot a graph of the weather for a week.

Plot a graph of the heights of trees in relation to where they are on the school grounds.

Plot the movement of the stars.

Plot the changing of a tree's shadow in relation to the time of day.

Chart the speed and distance covered by different children.

Use twine and stakes to make triangles, etc. -- measure and plot.

Follow-up for - Mathematics

Measure the room and figure how much tile it would take to cover the floor.

Draw a scale map of the school grounds. Make a contour map from this.

Make a graph of the weather forecasts for a week.

Make a chart showing several ways to estimate the height of a tree.

Use facts from the out-of-doors to make problems.

Mathematics (cont.)

Plot a graph showing the percentage of rainfall.

Plot a graph showing the amount of water coming down a slope.

Draw a chart showing personal measurements by percentage of human body.

Science

Objectives:

A. To be able to recognize some of the common plants and animals in the local area.

B. To understand some of the interrelationships of plant and animal life in different environments

C. To understand the need for conservation of plant and animal life

Concept-A plant is a living thing.

(activities)

Make a color chart and paint pictures using the natural pigments from leaves, stems, berries, seeds, flowers, decayed wood, and other plant parts.

Carefully wash away the soil from around the root systems of plants and compare:

a. amount of plant underground to amount above ground
b. structure of root systems of different kinds of plants
c. root structures of the same kind of plant growing in different locations
d. color, branching, fiber strength, and other distinctive characteristics

Mark off, with stakes and string, three-foot square quadrats in different locations and in different plant communities. Consider the following:

a. light intensity (found with a photographic light meter)
b. direction of sloping land surface
c. number of different kinds of plants
d. amount of bare ground and ground covered with vegetation of different kinds. (Make a simple map of the quadrats showing your findings.)

Make a scientific study ring by shaping a wire clothes hanger into a circle. To make a plant analysis of a lawn or field, randomly throw the study ring twenty times and keep a record on a chart of how many times a particular kind of plant occurs inside the ring. Make a sketch of each plant chosen for study. Determine the percentage that the plant is found in the ring. For example, if a chosen plant occurs inside the ring during ten of the twenty tosses, its distribution covers approximately 50% of the area.

Experiment with a common lawn plant such as a dandelion or plantain. Mark each with a stake and pull off varying numbers of leaves from the plants. Note how this treatment affects the plants.

Place carpet tacks or brads around the edges of a growth of lichen on a tree. In a few months measure the growth rate of the plant.

Science (cont.)

Make a "tree clue" chart to observe trees through various seasons of the year. Rule off an 8½" x 11" sheet of paper so that it contains nine vertical columns. At the top of each column write or abbreviate the following words: tree shape, leaf arrangement, leaf shape, buds, bark, flower, fruit, distinctive characteristics, and name. For each tree observed describe or sketch in the appropriate characteristic if it is observable. Find the name of the tree by using a tree reference book or tree key.

Place two differently colored thumb tacks twelve inches apart in a branch of a fast growing shrub or tree and periodically measure and record distances between:

a. the two thumb tacks
b. the tacks and the main trunk
c. the tacks and the ground surface
d. the tacks and the tip of the branch

Place a plastic (polyethylene) bag around the leaves at the tip of a branch of a plant and close the end of the bag tightly with a piece of string or rubber band. After a few hours observe the inside of the bag. What does this show?

Take a piece of paper (adding machine tape works well) and place over the sawed cross-section of a tree stump. Rub the paper with the side of a pencil and the growth rings will be recorded.

Estimate the age of conifers by counting the whorls of branches.

Have a student make a seed collecting burlap "suit" by cutting arm and head holes in a burlap bag and have him wear it while walking through low brush and weeds. (This works well in the fall)

Follow-up for - A plant is a living thing.

Draw a chart showing the parts of a plant.

Set up an exhibit showing kinds of seeds.

Put up a collection of pressed plants--harmful and helpful to man.

Make a chart showing how seeds travel.

Make a chart showing the uses of wood--put wood samples on it.

Make a scrapbook of leaf prints--by blueprint, ozalid, or spatter. (Mobile Unit)

Make a scrapbook of uses of wood--with pictures, leaf prints, and story.

Make a report on proper cutting of trees and conservation.

Plant seeds in several types of soil--plot the growth.

Put one plant in dark, one in sunlight--plot the difference.

Science (cont.)

Make a picture showing how paper is made.

Draw a map showing main types of trees in the United States.

Write a report on how man and animals help seeds travel.

Make up stories about what an old tree might have seen in its lifetime.

As a plant grows, mark its growth with colored tape on a stick. Measure the rate of growth. Is it different?

Concept-An insect is an animal with three body parts and six legs.

(activities)
Observe an ant hill. See how the "social" insects work.

Study feeding places of butterflies and moths. Why do they come to certain spots to feed?

Collect, prepare and mount insects. Display them in areas i.e. types, helpful or harmful, parts of land (wet, dry, woody).

Turn over old log or large rock. Observe what lives there. Why?

Try to find the life cycle of an insect. Keep a cocoon until it hatches. Identify the larva and pupa of insects as you find them.

Find out how we control pests. See how they destroy crops, plants and leaves. (Observe tent caterpillars.)

Compare an insect community with single insect living.

Locate plants with aphids or plant lice. (use hand lens)

Examine several kinds of flowers to see where the pollen is and how the flower is arranged to make it possible for insects to carry pollen.

Observe the behavior of animals such as ants or beetles and note the methods of locomotion, other movements, reaction to heat, light, moisture, and touch.

Determine if grasshoppers and other jumping insects jump in the same direction when touched.

Compare the number and kind of animals found in a square foot of soil dug to a depth of six inches to the animals found in plots located in different places.

Make a survey of insects and the plants on which their evidences are found. Estimate the total number of certain kinds of insects in an area.

Attempt to find the sources of pollen observed on bees.

Develop a dichotomous identification key for a selected number of insects or other animals found.

Science (cont.)

Determine different speeds of locomotion of ants, other animals, or of the students in the class.

Determine if the position of the sun has an effect on the navigation ability of certain insects.

Follow-up for - Insects are animals with three body parts and six legs.

Make a terrarium with soil, a small dish of water, moss, sod, and rocks.

Put some caterpillars into a lamp-chimney cage (Mobile Unit). Feed them the leaves from the plant on which they were found. Observe them as they feed, make pupa cases, and change. Chart the change.

Make a frieze showing the life cycle of an ant or bee.

Make a chart showing how social insects live.

Make a chart of the insects found in your school yard and indicate the foods on which they live.

Study beeswax for its properties. Use beeswax on thread, chew it, use it to smooth an iron.

Put in a bee hive, with outlet in window. Observe the bees as they work.

Fix an ant house--watch them work.

Set up an exhibit showing the kinds of harm insects do.

Set up an exhibit showing how insects can help us.

Use collected insects to make pictures--imbed in plastic.

Make a chart showing the products made by a bee from its body and explain how they are made.

Concept-All birds are not the same.

(activities)
Make an analysis of materials found in nests and other protective shelters used by animals.

Identify birds and their location to determine if they prefer certain habitats.

Compare the size of birds to that of the crow, robin, and English sparrow.

Record the most striking colors on various birds when they are perched or flying.

Observe and describe the behavior of birds.

Science (cont.)

Estimate the number of birds in a flock.

Record the bird's flight pattern.

Describe the bird's beak and determine how it is useful in obtaining food.

Observe how young birds are fed and cared for. Observe the colors of the plumage of the young birds.

Obtain a wing feather and make a sketch of its structure.

Describe the feet of the bird and determine how they are useful to the bird.

Observe the birds and see on what they are feeding. Mark on clue chart. (directions on Mobile Unit or Teaching in the Outdoors, Hammerman, p. 47)

Find where birds have made nests and put feeding station there.

See "Observing Birds" activities for Grade Three, p. 18)

Follow-up for - All birds are not the same.

Make charts showing differences in birds (beak, feet, etc.).

Write a story showing how birds help us.

Keep a diary on the feeding station i.e. what bird comes, how many, etc.

Learn the birds from a flash card game (Mobile Unit).

Make a scrapbook of the birds observed.

Draw a large chart showing the parts of a bird.

Draw a large chart showing where birds come to your area and where some of your birds go.

Make bird models.

Use your clue chart to make a chart showing what you saw in the area.

Listen to bird call records. Play a game to see who can recognize the most birds from their call.

Concept-Animals must live in their environment.

(activities)
See how animals use their protective coloration.

Find homes of small animals. Why do they live there?

Bait a wet area with food and make plaster casts of the tracks the next morning.

Science (cont.)

Look for places where animals have eaten. Where are they getting their food?

See how animals protect themselves. Watch quirrels fuss at cats, birds, and animals.

Trap some small animals (mice, shrew, mole) and keep for a SHORT time.

Follow-up for-Animals must live in their environment.

Make a chart showing the main classes of animals.

Make a chart showing where animals live in the area.

Make a chart showing how animals protect themselves, feed, live, etc.

Make models of animal homes.

Keep some small animals for a short time to watch their feeding and living habits.

Write a story telling how animals live in the winter.

Make a chart showing how animals help and harm man.

Draw a picture showing main products we get from man.

Concept-Reptiles and amphibians are cold blooded animals with backbones.

(activities)
Look for snake skins. Try to pick them up intact. Observe with hand lens.

Get small frogs, newts, etc. from a pond. See where they were living. Try to find eggs and take them to the classroom to hatch.

Watch frogs in a pond. How are the animals in the pond helping man?

Pick up rocks and see if you can find small snakes there. What other amphibians or reptiles do you find there or under a rotting log?

Watch for homes of snakes. Why do they live there?

Put a frog or toad into a pool of water. How does he drink. Watch his tongue as he eats.

Put a snake into a sandy spot. Look at the track he leaves.

Watch for different colors of newts and salamanders. Why?

Follow-up for - Reptiles and amphibians are cold blooded animals with backbones.

Make a chart of the differences in reptiles and amphibians.

Make picture of different kinds of snakes--showing things to watch for in those that our poisonous.

Science (cont.)

Make cages and keep snakes for a short period.

Assign special reports to groups of children on types of reptiles and amphibians.

Make a chart showing how reptiles and amphibians help us.

Concept-Conservation is everyone's responsibility.

(activities)
Find a gully and look at a cross section. See if you can recognize the different layers. Gather samples of top and sub soil. Look for examples of pot holes caused by running water. Find the mouth of the gully and locate the sedimentary material which has been washed down. What causes the soil to wash away? What can be done about it?

Find an area in your school area that has gullys and eroded slopes. Try to correct the erosion by checking dams and through plantings.

Measure the slope of a hill and figure the amount of soil loss.

Plant a tree; check with the Forest Service for advice on the best trees to plant and how to get seedlings.

Visit a large pasture or natural range used by livestock. Find what plants are growing. Check to see if the area has been too heavily grazed. Do you find any evidence of rodents? What damage are they doing? Do you think the pasture is being used properly? What would increase production of forage?

Visit a recently cut forest area--check new growth. Was care used in removing the timber? Are there signs of erosion? What provision is there for fire protection?

Visit a burned woodland or pasture--find out the cause of the fire. To what depth was soil burned? Review what the fire destroyed. (values for wildlife, streamflow, recreation, fertility of topsoil) How long will it take to restore these values?

Visit a sawmill, wood manufacturing plant, or lumber yard to find out the source of the raw material, how the wood is sawed and processed? What species is represented? How is sorting and grading done? How is seasoning accomplished? What products are sold? What conservation practices are used for by-products or waste? Where does the operator expect to obtain his future supplies?

Follow-up for - Conservation is everyone's responsibility.

Make some soil artificially.

Compare soils by growing plants in them.

Compare how much water different soils will hold.

Make a chart of the water cycle.

Write a paper: "Our Forests--Now and Then"

Science (cont.)

Make posters--state maps of natural resources, outdoor good manners, conservation begins at home, clean highways, developing a school forest

Write on: "Great Forest Fires of History," "How Farmers Can Help Wildlife," or "This Material Called 'Humus'"

Exhibit forest products--collect and lable samples of different woods.

Make models of fire towers, areas logged by destructive methods and by good forestry methods.

Prepare a collection with labels showing which species of wildflowers may be picked--only sparingly--or not at all.

Prepare a large diagrammatic wall sketch showing comparative features of an unplanned and planned drainage basin with a managed watershed and a series of utilization projects downstream. (See Conservation Activities for Young People, Forest Service, U. S. Department of Agriculture)

Concept-Soil is an important part of the earth's crust.

(activities)
Examine a small quantity of soil under a magnifying glass or microscope. Can you distinguish between mineral and organic particles? Do particles adhere to each other?

Pulverize a piece of sandstone and feel the particles. Would plants grow in this?

Test soils from different locations for acidity. How do soils become acid?

Collect samples of gravel, sand, silt clay and loam and make notes on the location of each type of particle. Did plants grow where each was found? Which size particle will give up mineral plant food most readily? What effect does the size of a particle have on pore space?

Rub samples of different soil types between your fingers. Do they feel gritty? Raise your hand to your ear and rub soil between your fingers. Can you hear anything? What does this indicate?

With a piece of string, lay off a square foot of area of soil in two or more places. Count the number of insects, worms, and other animals within the upper inch of soil. Are they equally numerous in all types of soil? Why?

With a spade, determine the depth of the topsoil in several places. Is it the same depth in all places? Why?

Compare the color, texture, structure (looseness or compactness) and depth of topsoils in several places near a stream bed and in an upland.

Mix one-half pint of decayed organic matter gathered from a forest floor with one and a half pints of dry gravel, sand, silt and clay. Saturate each and weigh.

Fill a quart jar or tin can with sample gravel, sand, silt and pulverized clay. Weigh and saturate with water. Re-weigh it.

Place equal amounts of different types of soils in separate jars. Fill the jars with water and shake--allow to stand. What is the order of settling?

Collect a small quantity of dry soil and weight it in a tin can. Burn the soil in the can until all organic matter is destroyed and weigh the residue. What per cent of the soil was mineral material? What per cent of the soil was organic matter?

Punch small holes in the bottoms of five tin cans of equal size. Fill each about half full of several types of soil such as clay, sand, gravel, etc. Place a jar under each can. Pour the same amount of water into each can, and after five minutes note the amount of water which has drained into each jar. Explain.

Place several types of soils in separate cans. Add water and stir well until each reaches a soupy condition. Allow each to stand until thoroughly dried and describe the condition of each. Explain, with reference to use for garden crops.

Observe a stream that is depositing its load and find out in what order materials are deposited. Explain.

Show the effect of color of soil upon temperature by covering two thermometers with half an inch of different color soils, such as ground limestone and black woodland soil. Take data at intervals. Explain. What color soil is best for early gardens?

Set up a demonstration to show the effect of cultivation upon soil temperature and explain.

Study the effect of vegetation upon soil temperature by placing two thermometers at a depth of one inch in two plots, one covered with vegetation and the other in bare soil.

Fill two jars or cans with different types of soil--one with loose light soil and one with hard-packed soil. Drop one or two earthworms in each jar and watch to see which one burrows to the bottom first. Explain the statement that the earthworm is a soil builder.

Dig into the soil on a hilltop, on slopes in varying degrees, and in bottom land. Observe the different layers of horizons. Note the depth and color of the top soil. Note the amounts of raw humus, the size of the granules; compare the amount of roots in topsoil and the amount in the subsoil. Compare the smell and feel of topsoil and subsoil. What is the minimum depth of topsoil which supports a good vegetation cover?

After a heavy rain compare the runoff from a steep hill covered with vegetation with one in cultivation.

Compare the crop productivity on the windward and leeward sides of windbreaks.

Observe the changes in the types of vegetation which appear after a woodlot has been burned.

Calculate the stream flow in cubic feet per minute for a stream in the neighborhood. This is done as follows:

a. Measure the width of the stream.
b. Select point A on the stream and measure the depth at several places, securing the average. Multiply the width by the average depth to get the area at point A.
c. Select point B below A and ascertain the cross-sectional area there, e.g. 100 feet.
d. Measure the distance (D) between point A and B.
e. Throw a small piece of wood in at point A and measure its rate of movement to point B.
f. Use formula ½ (area at A+B area) multiplied by D and divided by time.
g. This is the stream flow in cubic feet per minute.

Take samples of the water in a stream and allow the sediment to settle out. Multiply the ratio of the sediment to the amount of water in the bottle by the number of cubic feet of water passing a point in one hour. The result will be the amount of sediment transported in one hour. Compute for a day and then for a week.

Put known volumes of samples of soils in eight ounce bottles so that each has equal amounts of soil. Using a graduate, pour water into each bottle measuring water used until absorbed. Which soils hold the most water? Why? Divide the volume of the soil, thus getting the percentage of pore space. Compare the percentage of pore space in loam, clay, sand, etc.

Compare the color and texture of soil dug from the upper six inches of a woodlot with similar examples from a cultivated field.

Compare the character of the soil in the various counties of Tennessee and explain the differences.

Compare the weights of equal volumes of sand, clay, loam, etc. Explain the differences.

Observe the different types of soil with a magnifying glass or microscope. Distinguish between rock and organic matter principles.

Test garden soils for acidity and make a list of crops which grow best in that soil. Use litmus paper, pH paper and other liquid indicators. Place the soil in a test tube and put soil on top. Observe color changes through the glass.

Fill a test tube about half full of dry loam. Next, put in about an inch of soil composed of lumps about as large as the end of an unsharpened pencil. Then, finish filling the tube with loam. Tie a cloth over the mouth of the tube and invert on a dish of water. What happens when the water reaches the lumpy soil? How does this illustrate the value of having fields and gardens well pulverized before planting?

Examine sand banks for evidence of stratification. Observe the manner in in which deposits are made. Is there any sorting? How?

Make sand pies of different types of soil to note differences in adhesiveness.

Spade up about two feet of soil along a ravine and notice the character of the soil at or near the surface compared with the subsoil about two feet below the surface.

Follow-up for - What is soil?

Take a core sample and glue it to a chart showing the different kinds of soil found in the school yard.

Make a collection of different kinds of soil and label each.

Plant something in several different kinds of soil to test which is best.

Make an earthworm home to see how the soil is affected.

Draw a chart showing what soil is composed of.

Make an exhibit of different things found in a square foot of sod.

Concept-A rock is a mixture of minerals and is formed in different ways.

(activities)
Determine how many different kinds of fossils can be found and develop a simple method of classifying them.

Find examples of how rock and man-made stone are used by man.
Develop methods of measuring soil erosion in different places.

Determine effective methods for preventing and checking soil erosion.

Determine how many different kinds of soil can be found and classify them according to their characteristics.

Compare the rates of water absorption into the ground in different locations.

Determine the water holding capacity of different soils.

Compare rocks according to color, color streak, texture, hardness, luster, fabric, fracture, density and other characteristics.

Compare the weathered surface of a rock to a freshly broken surface.

Determine the dip and strike of a rock outcrop.

Find examples of ripple marks, faulting, and folding in rocks.

Using a geologic map of the area, find various kinds of exposed rock formations.

Classify the soil fractions according to the size of particles and type of content. Determine the percentage of each soil fraction present.

Compare the relative soil compactness in different places.

Science (cont.)

Compare the effects of soil color and vegetation coverage on the soil temperature.

Compare the amounts of organic matter present in different soil samples.

Compare soil acidity and alkalinity and the amounts of potassium, phosphorus, and nitrogen in different places.

After a rain, compare the amounts of soil erosion in different places.

Compare the relative amounts of air contained in different soil samples.

Compare the depth of the topsoil in different locations.

Compare soil profiles in different locations.

Classify the land according to the Soil Conservation Service's eight classifications.

Determine angles of crossbedding in sandstone rock.

Collect specimens of the types of rocks found in this area. Learn to identify them on sight.

Look for examples of rock structures such as stratification, mud cracks, ripples and pitting, faulting, folding, cross bedding, glacial striae, etc.

Make a collection of common rocks and minerals of state or county.

Make a map in colors to show the location of different types of rocks or minerals in the state. Make a map to show the location of mines in the state.

Make a list of all minerals or rocks used in the home or school and trace their origin.

Look at pictures of the Grand Canyon, Niagara Falls, Delaware Water Gap, etc., and discuss the work of streams.

Pound up a piece of soft rock until it becomes soil.

Use the rock tumbling machine on the Mobile Unit and make jewelry and collections of rocks and minerals.

Make a map of your area showing rocks and minerals found there.

Test rocks found for hardness.

Make an exhibit showing rocks and what they are used for.

Show slides and pictures of rocks and minerals.

Play the rock game and use rock flash cards to learn types (Mobile Unit).

Science (cont.)

Concept-Weather affects all living things.

(activities)
Get a weather station from the Mobile Unit and keep a weather chart for two weeks.

Determine if the temperature of the air varies in different places. Determine some of the factors which may cause these differences.

Design and make simple devices to measure the relative wind velocity and direction in different places and at different elevations.

Devise a way of measuring the evaporation rate of water in different locations.

Find examples of weathering of natural and man-made rock.

Compare the different cloud types and estimate their elevation.

Determine the speed and direction of moving clouds.

Attempt to discover evidence of air pollution.

Compare the relative humidity in different places and at different times of the day.

Find the air pressure at different elevations and at the same elevation during different times of the day.

Compare the amounts of radiation absorption in differently colored materials.

Determine the temperature by using the chirps of a cricket.

Make weather forecasts based upon the readings of weather instruments.

Observe and compare the six basic shapes of snow flakes.

Campare the various depths of snow in different places and determine the reasons for these differences.

Record and compare the temperatures of the air, soil, and snow at different depths.

Determine the amount of water in a cubic foot of snow and calculate the ratio of air to water.

Evaporate some snow and observe the residue.

Observe the effects of rock salt on snow.

Observe a cross-section of accumulated snow and compare it to the formation of certain types of rock.

Determine the acidity or alkalinity of melted snow or rain.

Science (cont.)

Compare the amount and texture of melting snow on a north-facing slope to that on a south-facing slope.

Determine how much water will be accumulated from a specific amount of precipitation falling on a roof.

Determine how far away a thunder storm is with the aid of thunder and lightning.

Follow-up for - What is weather?

Make a wet and dry thermometer (Mobile Unit).

Make pictures of different kinds of clouds--use cotton.

Make and plot a weather chart for several weeks.

Look at slides and films on clouds and weather.

Make some weather instruments for the home (Mobile Unit).

Draw a map showing high and low temperatures in different parts of the country.

Write a paper telling how temperature affects how men in different areas live.

Make a set of weather flags and put up a weather flag pole for the school yard. Forecast and put up flag each day.

Concept-There is more than the earth.

(activities)
Plan an evening back at school to observe the stars.

Make a star map.

Visit the planetarium at the Children's Museum.

Make star trails using a camera (700 Experiments for Everyone, page 68).

Learn to plot star positions on a stellar position chart (Ibid.).

Follow-up for - There is more than the earth.

Read stories about the constellations.

Make up your own star legends.

Make a constellation flash card set and use to learn the star patterns. (Mobile Unit)

Make a cardboard planetarium (Stepping Stones to Nature, Bale, p. 25).

Science (cont.)

Make a papier-mache heaven (Bale, p. 26).

Make a blueprint of the stars (Bale, p. 27).

Learn how to read the star clock (Bale, p. 16-17).

Make a cardboard astrolabe to measure the angle of stars (Mobile Unit).

Concept-Maps show more than direction.

(activities)
Make a map of an area using different methods.

Determine the differences in elevation to find the water level of a pond if a dam of a certain height were constructed.

Fill in information about dominant vegetation on a base map made from an aerial photograph.

Mark off contour lines on a hillside and then make a contour map of the hill.

Find the location of bench marks with the aid of a topographic map.

With a compass, determine the azimuths to landmarks within a sight. Walk to them and try to return to the starting point using only the compass.

With a map and compass walk to landmarks that are not visible from the starting point.

With a compass, walk the perimeter of an equilateral triangle and try to end up at the starting point.

Measure land areas using different standard units such as a yard stick, tape measure, meter stick, forester's chain, or rod.

Measure land areas using different non-standard units such as a pace, arm-yard, cross-reach, or body length.

Compare the slope of the land to the amount of soil erosion in each place.

Make a shadow clock to tell the time of day and relate the shadows to compass direction.

Follow-up for - Maps show more than direction.

Use the compass game from the Mobile Unit--set up and run.

Make a large model compass showing degrees and directions.

Mark your room (letters on wall) by directions.

Make a large wall map of your school area.

Obtain topographical maps of different areas and see if you can find different things marked on them.

Make a chart showing different types of maps.

Make a chart showing symbols found on topographical maps.

Concept-Organisms depend on environment for the conditions of life.

(activities)
Determine how different depths and locations affect the water temperature.

Determine some different ways in which aquatic plants and animals can be classified.

Find evidence of plants and animals that make up various food chains.

Make a map of the different depths of a pond or stream.

Measure the distance across the pond or stream.

Determine the types and quantities of plant and animal life found in different locations and at different depths.

Determine the acidity and alkalinity in different locations.

Determine the turbidity of the water in different locations.

Determine the composition of the bottom of the pond or stream in different locations.

Compare the temperatures of the water to the temperatures of the soil around it.

Determine if the amount of sunlight and sunlight penetration affects the growth of aquatic vegetation.

Mark off the boundaries of the watershed of a pond.

Determine the surface area and volume of water in a pond or section of stream.

Find evidence of water pollution.

Collect some oxygen given off by aquatic plants.

Make a vegetation map of the plants in and around the pond or stream.

Use a microscope to examine small plants and animals found in the water.

Find aquatic animals in different stages of growth.

Construct check dams along streams.

Determine the rate of flow of a stream in various locations.

Determine the location of sediment deposition around the curves in a stream.

Language Arts

Objectives:

A. To express oneself in both the written and spoken word

B. To read and interpret correctly

Concept-Adjectives are everywhere.

(activities)

Use figures of speech to describe the out-of-doors such as alliteration, metaphor, simile, hyperbole, or onomatopoeia.

Using the senses of hearing, touching, smelling, tasting, and observing, describe your impressions of objects of nature.

Choose something which appears at first to be ugly or not particularly beautiful. Describe the object again after looking at it carefully.

Observe and describe familiar shapes, forms, designs, or figures in objects such as gnarled wood, areas of light between tree branches, clouds, or rocks.

Listen for a short time and list all the different kinds of sounds heard. Develop a system to increase your retention of new sounds heard.

Blindfold each child and give them an object from outside. Have them describe its odor, surface, size and suspected color. The holder cannot name the object. Others try to guess what it is.

Take a walk- On return, describe either orally or writen the thing which impressed you most. With emphasis on a particular object or scene, then report or write about what you saw. Compare each to difference or similarity. Make up an original story after an out-of-doors walk.

Chew on a leaf--describe the smell and taste of the leaf.

"Smell and Tell": Describe the smell of the lunchroom or the smell of a wet or dry day.

Concept-Nature stimulates creative expression.

(activities)

Write about the seasonal changes that might occur in your immediate location.

Try to imagine what your immediate location would be like in ten, fifty, or one hundred years.

Express your reactions to the natural environment through the medium of Haiku poetry.

Personify a tree in a cemetery, along an old road, or at a home site.

Write a story about a miniature world as magnified through a hand lens.

Language Arts (cont.)

Write about the thoughts that occur as you are seated in the woods.

Compare the writings of poets such as Keats, Wordsworth, Sandburg, or Frost and the writings of authors such as Emerson, Thoreau, Burroughs, Muir, or Audubon to how you react to the same things that they write about in nature.

While in the out-of-doors, construct an outline for a factual report of an experience.

Take field notes of important information discovered outdoors.

Write a ficticious diary of a person who might have: lived in an old house, travelled an old road, or played in the woods.

Examine the meaning of various words related to the out-of-doors.

Compare how differently each person perceives his environment by having each one write about it and share what he has written.

Have the pupils compose the ending for an unfinished story about the out-of-doors.

Discuss outlining in class. Take a partial outline outside and then have the class complete it.

Make a nature picture on the ground using objects or things found in the surrounding area. Tell about it.

Use nature trails to foster language arts. Example: Look for things beginning with capital letters.

Smoky Bear on School Site - Discuss how the area has been misused and then how it can be improved. In the classroom, make a "Do's and Don'ts Chart."

Suggested questions:
- What would be a good adventure for you today?
- What thought always soars you high in spirit?
- What picture flashes in your mind when you hear the word "happy"?
- When and where have you found beauty in silence?
- What is a secret?
- How high is up?
- How deep is down?
- What smell do you like to smell best?
- What is a home?
- What is sadness? A smile?
- Where is treasure?
- What is a friendly sound by day? By night?
- What is the best taste you have ever tasted?
- What have you touched which made you wonder?
- Who are you?

Create a story by allowing one person to begin telling the story, stopping him, and having another pupil continue. This process may go on until the story is concluded.

Language Arts (cont.)

Dramatize stories about life in the woods.

Play Charades--telling stories without words, using hands, facial expressions,etc.

Have a conversation between two characters, perhaps a rabbit and eagle or two birds. Each may use only one word at a time to convey his question or idea.

Social Studies

Objectives:

A. To create an interest in and understanding of local history.

B. To create an understanding of the relationship between man and his environment.

Concept-Man must live in his environment.

(activities)

Find evidences of how man has affected the environment.

Find evidences of how the natural environment has affected man.

Make a physical and cultural survey of the area.

With a compass in hand, set a bee-line course and hike cross-country. As you go, record the human and physical geography on a topographic base map.

Water Sources: Have the children find out what sources of water are available on your outdoor education site. Pioneer stories often tell of people drinking water from rivers, streams, and springs. Ask why we don't use certain sources now. What inventions have made our own water supplies available to us?

Concept-An understanding of man's early history brings awareness and appreciation.

(activities)

Determine why the early settler would choose a particular location for his home site.

Make a rough sketch map of a home site and other man-made features such as outbuildings, well, pond, road, or cellar.

Compare aerial photographs to the land. Obtain aerial photographs taken 20 or 30 years ago to observe the changes that have taken place.

At an old home site foundation, make a sketch of the building and vegetation as you think it might have looked when it was occupied by man.

Obtain some old tools and figure out how man used them.

Social Studies (cont.)

Make a fire with flint and steel and bow and drill.

By observing old buildings, figure out how they were constructed.

Examine old farm sites to determine what type of people lived there at various times.

Explore for artifacts which provide clues of how the people lived.

Explore a cemetery to discover the local history recorded on the grave stones and surroundings.

Take your class to a wooded area and divide them into groups. After a short discussion, each group will dramatize some phase of pioneer living--clearing of land, house-raising, gathering and hunting and fishing, husking or quilting.

Visit a wooded area and discuss whether or not this would have been a good place for pioneers to live in? Why or why not? What natural resources would make it good (trees, water, etc.)? What disadvantages? If you had been a pioneer settling here, where would you build your home? Of what materials? What would you probably wear? Crops? Hunt? Fish?

Visit Traveler's Rest to see artifacts and skeletons in stone box graves.

Visit the Indian Museum at Kirkland Hall on the Vanderbilt Campus.

Visit the exhibit of various kinds of Indians at the Children's Museum.

Collect seeds of barley, oats, and wheat. Use two clean, smooth rocks dried in the sun. Grind the seeds, sift the grindings to separate the flour (ground-up seeds) from bran (coverings). Use your flour as regular flour--bread, pancakes, cereal.

Personify a tree as an old man and discuss the "neighbors" he has had in his lifetime, i.e. the uses of the land over the years.

Go on a field trip to gather grapevine--make Indian games.

Locate old maps of Nashville and use an Early History of Nashville by Elliott to mark a new map with the old landmarks.

Go on a trip to locate old landmarks--try to find the spring Miss Elliott talks about.

Using the site guide put out by the State Department, follow the Battle of Nashville by visiting each site. Make a map. Have different groups be different sections of the two armies.

Gather clay from a clay bank and make Indian pottery.

Arts and Crafts and Music

Objectives:

A. To give the child an opportunity to explore a variety of media (emphasis

on natural materials)
B. To consider art and music as a part of everyday living
C. To develop handiness with common tools
D. To see art and music everywhere

Concept-Nature offers a storehouse of materials.

(activities)
Find examples of characteristics of abstract art in nature.

Record how many colors you can observe in a small area delimited by a circle of two inch diameter.

Draw a picture about a story read in the out-of-doors.

Form the body into shapes of trees or other natural objects observed.

Make arrangements of dried grasses and other plants for decorative purposes.

Take photographs in the out-of-doors.

Squint the eyes to see differences in light and dark. Make a sketch of what you observe.

Find examples of lines and shapes in nature.

Find examples of design in movement.

Experiment with branches, feathers, bones, grasses, seeds, or other natural materials as paint brushes to create various effects such as massiveness or delicateness.

Use wood charcoal from a fire to make a sketch.

Find natural clay in a stream for modeling with the hands or a tool such as a stick or rock.

Use plant pigments from flowers, stems, fruits, leaves, and/or rotted wood to make a sketch on fine sandpaper or paper.

Make a collage of pebbles, seeds, or other plant parts using surfaces such as a slab of wood or cardboard.

Represent textures in nature such as tree bark, rock, or seed pod surfaces with modeling clay.

Find different surfaces to draw or paint upon such as pieces of wood, bark, or rock, packed soil, woven grass mats, or leaves.

Make natural paints and dyes with plants, muddy water, or other natural colors.

Use objects such as wood, bark, seeds, leaves, or other natural objects to make prints on paper or cloth.

Arts, Crafts, and Music (cont.)

Cut designs in vegetables usch as a potato or turnip for block printing.

Weave grasses and other vegetation into mats.

Make animal figures out of objects such as twigs, stones, and seeds.

Carve from soft wood or tree bark.

Find different shades of the same colors.

Make sand castings with mud, clay, or plaster of Paris.

Make clay masks of Indian faces while at the Indian shelter.

Make twine or rope from the inner bark of certain trees.

Construct mobiles using natural materials.

Use liquid plastic to embed natural materials for key chains and pins.

Make a plaque with natural materials--use liquid plastic to preserve them. (Mobile Unit)

Use the tumbled stones to make jewelry.

Gather corn shucks to make mats and dolls.

Make ozalid and blue prints (Mobile Unit).

Concept-Music is everywhere.

(activities)
Make different sounds and rhythms from the objects of nature such as stones, seeds, sticks, or dry grass.

Dance to natural rhythms and sounds such as the wind in the trees or grasses, the flowing water, or the calls of insects or other animals.

Make a willow whistle.

Imitate animal sounds.

Using a tape recorder, record animal sounds.

While listening to tape recordings of music related to the out-of-doors, determine how the composer represents nature's sound and rhythms.

Compose songs based on outdoor experiences.

Health, Physical Education and Recreation

General Objectives:

A. To develop a wholesome mental attitude and proper habits
B. To practice good health habits
C. To plan and practice wholesome use of leisure time
D. To keep physically fit
E. To develop an awareness of safe practices in the outdoors
F. To integrate health and physical education with other subject matter areas

(activities)
Planning healthy meals

Preserving foods by drying or salting

Identifying edible wild plants and understanding their food value

Identifying poison ivy by the leaves, by the woody branches or vines, and by the fruit.

Dressing properly and adequately for different occasions

Discussing and solving group living problems

Practicing outdoor safety: how to go up and down a hill; how to carry and use lumbering tools; being sure that water is safe to drink; care of fire on cook outs; how to purify some water for drinking purposes; utilizing proper safety measures and conduct when hiking; laying and marking trails

Dancing (pioneer, square, round, Indian, folk, play party games)

Carrying out service projects such as: building a retaining wall; developing outpost sites; cutting firewood; setting tables; making beds; keeping buildings clean; clearing underbrush; establishing fire stations

Fishing

Playing games: skittles, stalking a deer, Duck on the Rocks, Up Jenkins, Indian corn game, Japanese checkers, Capture the Flag, Huckle Buckle Bean Stalk, Who am I?, Touch Memory, Singing Syllables

Enjoying winter sports: ice fishing, skating, making and using snowshoes

Examples:

Who Am I?
Have each child write on a slip of paper the name of one animal or tree (or other living thing) and pin the slip on the back of another player. As soon as each player has a slip, all players try to discover their own identities by asking other players questions that can be answered yes or no. When a player has found out who he is, his slip is removed from his back and pinned on the front of him.

Touch Memory
While another game is being played, have a committee of three or four members each find six things that might be recognized by touch--a leaf,

an acorn cap, a mushroom, a blade of grass, a dandelion blossom, and a twig. Upon the return of the committee, have all the others line up in three or four lines and hold their hands behind them. One member of the committee should pass behind the players in each line, allowing each player to feel one of the selected objects. When all players in a line have felt one of the objects, each player should be given time to write down the things he thinks he has felt. The children who have the most accurate lists when all the objects have been felt and identified might be members of the next committee.

Singing Syllables
The class selects one person to be It, and he leaves the group. While he is away, the children select one of the new words they have learned and divide it into syllables. The class is then divided into groups so that each group can sing one syllable. It is called to return and the entire class begins to sing, on the pitch given, with each group singing its own syllable. Then It must guess the word without asking any questions. A creative class might work some rhythmic pattern into the singing or do some harmonizing.

References:

Hammerman, Donald R. and Hammerman, William M., Curriculum Enrichment Outdoors, Harper and Row, New York, 1965.

Hammerman, Donald R. and Hammerman, William M., Teaching in the Outdoors, Burgess Publishing Company, 1965.

MacMillan, Dorothy L., School Camping and Outdoor Education, William C. Brown, Dubuque, Iowa, 1956.

Zim, Herbert S., Plants, Harcourt Brace and World, 1947.

Physical Education Activities (General):

Outdoor Education and Physical Education work together to create games and activities from natural materials. Some of the games are just recreational while others develop skills which lead up to other games.

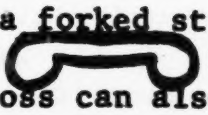
Indian Ring Toss-

materials needed: grapevine, cord, starbs
The grapevine is bent and tied (lashed) with the cord. The starbs can be put any distance and marked with numbers. The game is played like ring toss.

Indian "Deck" Tennis-

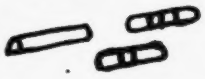
A grapevine ring is thrown over a net by teams.

Indian Stick Relay-

Teams of as many as wish may play. Each team member has a forked stick. A ball of leather stuffed with rocks or cloth shaped like  is tossed from one stick to the next. A team game like lacross can also be played with these.

Indian "Dice"-

Branches, cut in half and marked with numbers, are "thrown" like dice. Each player keeps score.

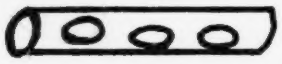


Hoop Rolling-

Hoops of grapevine can be made and rolled in a race.

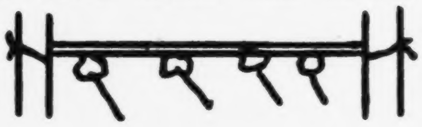
Log and Stones-

A hollow log or one with holes (enlarge them) is placed on the ground. Children have stones which they toss at the log. Each hole is numbered and score is kept.



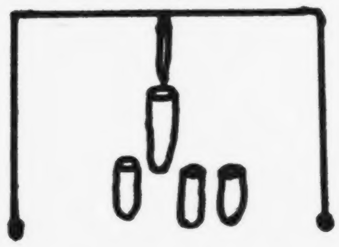
"Card" Race-

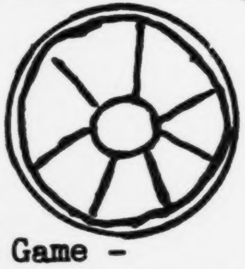
String is tied to a pole tied lengthwise between two trees. String is tied to the pole. On each string a cardboard or thin wood figure is placed with a hole in the center. Each player holds the end of a string and at the signal tries to make the figure come down the string to his or her hand. The string cannot be held below the waist.



Log "Bowling" -

A log is hung from a cross bar. Three smaller logs stand underneath. The log must be swung in an arc and know down the logs on the way back.





Web Game -

Grapevine is used to make a ring. A "web" of string is made inside the circle. There can be two teams or a group and a leader. The hoop is thrown by the leader or member of one team. The object is to catch the ring on a stick held by each child. The ring "web" can be given number values--each section a different score.

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Small Fresh Water Animals and Insects (FS)
The Busy Honeybee (FS)
Backyard Insects (FS)
Insects - House Fly (F)
Indians of Mexico Today (FS)
Prehistoric Indians (FS)
Identifying Common Trees (FS)
Trees and Flowers in the Four Seasons (FS)
Telling Trees Apart (FS)
Trees - The Oldest and Largest Living Things (FS)
Trees In The Forest (FS)

Stories of The Constellations

Universe and Solar System (FS)
How We Learn About The Sky (FS)
The Big Sun and Our Earth (F)
Pictures In The Sky (FS)
Fun With Stars (FS)
How Green Plants Help and Make Food (F)
How Plants Make Food (FS)
Origin of the Land Plants (F)
Parts of a Flowering Plant (FS)
Plants Grow (FS)
Plants and Flowers (FS)
Life of a Plant (F)
Plants That Grow from Leaves (F)
Balance Among Living Things (FS)
Plants and Strange Animals (FS)
Algae (FS)
Small Creatures of the Desert (FS)
American Mammals (FS)
Animal Behavior (FS)
How Animals Live in Fresh Water (FS)
How Animals Live in the Forest (FS)
American Reptiles and Amphibians (FS)
What Animals Give Man (FS)
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Animal Musicians (FS)
Air and Water (FS)
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B. Flowers
C. Insects
D. Trees
E. Reptiles and Amphibians
F. Stars
G. Mammals
H. Seashores
I. Fish
J. Fossils
K. Gamebirds
L. Zoology
M. Weather
N. Gamebirds

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MATERIALS CENTER

Film Strips

Trees - The Oldest and Largest Living Things
Why Trees Are Important
Use and Care of Wood Working Tools
Animal Protection Series
Forests of Tennessee
Mineral Resources
The Nashville Story
Then and Now in Tennessee Valley
Use Your Library for Better Grades and Fun Too
Nature Study Series
Stories of the Constellations
Construction With Compass and Straightedge
Continents and Oceans
Correlated Science Series
Country Community Series
Weather Series
The Sky Series
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Children of Pioneer Times Series
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Our Changing Earth
Our Earth

Slides

Clouds and Weather

Recordings

Ballads for The Age of Science
Hymns of The Circuit Riders

MATERIALS CENTER - FIFTH GRADE

Films

Telling Trees Apart
Universe and Solar System
Look to The Land
Life In The Forest
Wonders in Your Own Backyard
What's Under the Ocean
Treasures of The Earth
Our Big Round World
The Golden Groves
Clouds
Asteroids, Coments, and Meteorites
Good Sportsmanship
California - Life in Mediterranean Lands
Treasures of The Forest
Rocky Mountains - A Geographic Region
How Indians Build Caves
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Heat-Light-Sound
Conserving Our Soil Today
Cooper - Mining and Smelting

Tennessee Game and Fish Commission
Film Library
1600 Lock Road
Nashville, Tennessee 37207

United States Bureau of Mines (19 films on states)

Over 200 films from Film Bureau of Canada

Esso Oil Company

Tennessee Department of Conservation
West End Avenue
Nashville, Tennessee

LEAF PEOPLE

There are many ways to make leaf people. Here I will talk about two of these ways. You should try to think of other ways to make leaf people. Try as many different ways as possible.

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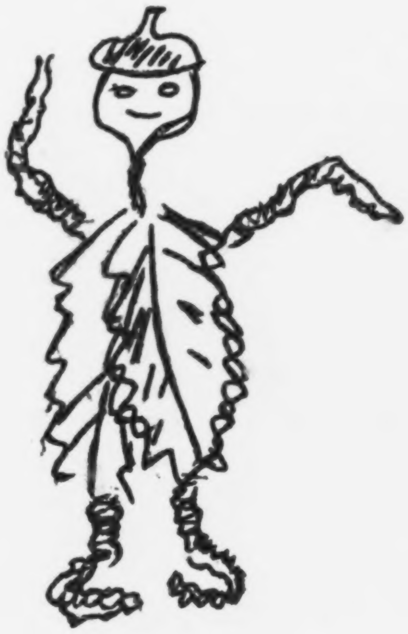
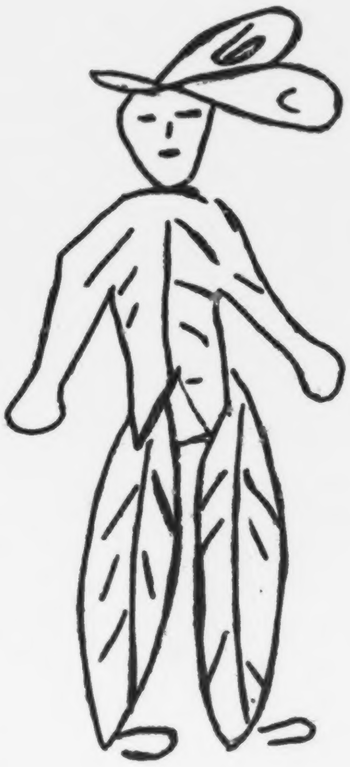
The first way to make your leaf people is with pipe cleaners, glue, and natural material that you can gather. Some of these natural materials might be: acorns, small pine cones, galls, twigs and the like.

Use an acorn, crabapple, or pinecone for the head. With pipe cleaners, form the body, arms, and legs. Then, using leaves of different shapes and sizes, put clothing on your figures. Try to use long narrow leaves for trousers, short round leaves for skirts, wide full leaves for shirts and so on.

The diagrams on this page will help you. Do not copy these figures but make your own, using these for ideas.

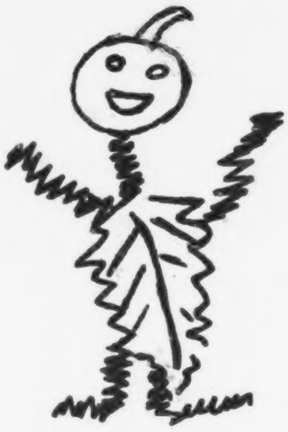


The second way to make leaf people is with some construction paper, crayons and glue. Begin by gathering leaves of many different sizes and shapes. Press them flat.



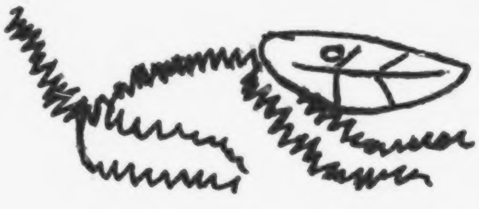
Draw, in pencil, an outline of the person or animal you wish to make. Carefully glue leaves on the paper to form trousers, skirts, shirts, hats, gloves, and other pieces of clothing.

Now go back to your picture and color the figures wherever they are not covered by leaves. You can make many kinds of figures in this way.



Perhaps a boy with willow leaves for pants, a maple leaf for a shirt, with a small sassafras leaf for a baseball glove would be interesting.

After you complete your picture frame it with construction paper of some bright color and hang it on your wall.



LET'S ADOPT A TREE - FALL

One of the best ways to learn about trees is to adopt one in your neighborhood for your very own. Then you can watch your tree throughout the year and observe its changes from season to season.

Begin by picking out a tree. Then identify it. You can find several books in the library which will help you to identify your tree.

Next, begin a booklet about your tree. Perhaps you would like to sketch your tree and use for the cover of your booklet. Inside the booklet you will want to put pressed leaves picked in Spring, Summer, and Autumn when they are the most colorful. In Winter take a small winter bud to complete your collection.

Perhaps you might like to take a picture of your tree with your camera and include this in your booklet. If you can't take pictures, you can draw some sketches of your tree in the various seasons.

RECORDING DATA

One section of your booklet should be a diary. Each week visit your tree and record what has or is happening to it. Some of the things you might look for are:

1. The date the first leaves change their color.
2. Any animal or bird that makes its home in your tree.
3. The height of your tree in the spring and again in the fall.
4. The diameter of your tree in the various seasons.
5. The times that the leaves begin to fall.
6. Any visitors to your tree, such as a squirrel, raccoon, bird or the like.
7. Plants growing on your tree, such as vines, moss, fungi, or lichens.

These are a few suggestions of the things that you can do with your adopted tree. You can think of many more. Wouldn't this make a fine science project?

FOLLOW-UP SPRING ACTIVITIES

1. Spring is a good time to emphasize the growth of plants. Children should know there are several different ways to start plants. Potatoes start from an eye, carrots from the tops, most flowers from seeds, and tulips from bulbs. An area beside the school would be a good place to plant some of these and watch them grow.

2. If there is a spare flower around, cut it up and have the children put it together. This is a good way to learn the parts of the flower, such as leaf, stem, root, and petal.

3. Talk about flowers and seeds. Can more flowers grow if we pick flowers that make seeds?

4. While on a hike turn over a stone or log. Look for ant eggs and other life under the stone.

5. Point out the animal homes such as holes in trees or the ground, animal homes in the water, and even cracks in the sidewalk.

6. Study the farm and farm animals and what they are. A trip to the farm is always exciting in the spring.

7. The children will probably notice that there are more birds than in the winter. Where did they come from? Start a bird unit. A good preparation is for each child to make a bird book with the name of the bird he saw and the date that he saw it. Point out the differences in the male and female birds. What do birds have instead of fur? If you are ever lucky enough to find some owl pellets, be sure to break them open to see what the owl has had for lunch the day before.

8. Why are baby animals born in the spring? What does the weather and season have to do with this?

9. Watch a thunderstorm and talk about lightening and thunder and rain. Can the children see that the rain is coming down from a certain direction? Why?

10. Watch hail and sleet. Let them go out afterwards and feel it, and see what has happened.

11. Feel the wind; fly a kite; make pinwheels and watch them blow.

12. On a foggy day let the dhildren go out and feel the fog. What is it? How does it feel? What causes fog?

13. Have the children make butterflies. Before the children arrive the next day take these out and tack them on to trees, bushes, etc. Let the children look for their own. It helps with recognition. See what else they can find while they are outside, such as buds, wildflowers, leaves opening, etc. Encourage them to really look and see.

14. On a clean-up day pick up sticks and rocks off the school ground. Save the sticks and any flat rocks that you may find. Paint numbers on the flat rocks and put these upside down in a box or sack. The child selects a rock, throws it so the number comes up and selects that number of sticks. The child with the most sticks wins.

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NATURE TRAILS

BUILDING A TRAIL:

A Nature Trail is a self-operating devise for imparting information about some of the things found in nature and located along a path. These may include rocks, plants, animal signs, insects at work, erosion, insect homes or anything else close to the path.

The path should be easy to follow and should lead by points of interest. It should be marked with labels, signs, or guideposts that provide interesting information, and that stimulate people to learn more.

The nature trail should be so laid out and labeled, that the person using it needs no other guide. Labels and markers should tell where more information is available on the item under consideration.

A nature trail need not be long. Often a few hundred feet is sufficient. Labels should be spaced so that on sign or label may be seen from the previous one.

A nature trail is one of the easiest ways to impart nature lore and to stimulate people to learn more. The purpose of this project is to point up all the fascinating things that studends can discover on the grounds. Many times they come back from a hike having missed most of "the show," and a nature trail will show them how to isolate all the individual special things that they may otherwise overlook. Be sure and let your students do most of the work in planning this trail-that is the fun of it. They will need some guidance, of course, in doing this, such as where to put the trail, how to select the things to be labeled, how to make the labels, and what to say on them. Let's take them in that order:

WHERE TO PUT THE TRAIL:

The entrance should be conspicuous enough to attract attention, hear your school building, but the area should be protected from being overrun by groups having other interests. The trail should have as much variety as possible. Try to include some woodland, a stream, perhaps a cool ravine (a rocky ledge) and a bit of open meadow. Plan lookouts to enjoy the view and to spot birds and animals. Its length will depend upon the available area, the terrain and distribution of interesting features, but one-half mile is recommended. You might utilize existing paths connecting two important centers, but be sure that the trail brings you back approximately to the starting point.

HOW TO SELECT THE THINGS TO BE LABELED:

Big trees, interesting shrubs, rock ledges, anthills, waterfalls, beaver dams, animal holes and animal tracks are all interesting things to look for. Short by-trails off the main one to interesting items are fun..Bear in mind that this is not a static project; new and exciting things will be discovered constantly that your students will want to label. If your students are more than one class, each group will make its own discoveries and will want to put labels of its own. Encourage each group to do this. Try to include as many of your groups' "adopted trees" on the trail as possible. This will give the project much more personal interest on the part of the students and will inspire them to make labels for their "adopted trees".

At the beginning of the trail, place the first sign telling of the nature trail and its purpose.

HOW TO MAKE THE LABELS:

The simplest and easiest labels are made from good grade shipping tags, about 3 x 6 inches. These should last throughout your camping season, especially if they are sprayed with clear plastic Krylon after they are lettered. All the labels for your nature trail may be made in your craft work. Labels should be tied to a twig or tacked to a rustic stake by the item to be identified and should be close enough to the trail to be read easily. Never nail a label to a tree or other growing plant.

The lettering should be printed or written in large script, using India ink. A Speedball pen is excellent. Don't use a typewriter. More permanent labels may be made of wood, masonite or metal. If you use zinc or tin, these may be enamelled, lettered in India ink and then given two coats of shellac. Many schools have pyrography sets or electric needles and using these for lettering wooden labels produces a pleasing effect.

WHAT TO SAY:

Try to be as original as possible. Short couplets with "punch lines" are fun, such as the famous one on the Bear Mountain Nature Trail in New York State:

"Happy are cicadas' lives
For they all have voiceless wives."

Vary the size and shape of the labels for interest. Use imagination in designing the shapes and lettering. A leaf-shaped, cut-out sign is an example of one that might be used. Pictures may be cut from pamphlets, cemented to a sign and waterproofed.

It is important that students become acquainted with the conspicuous features of each habitat on the trail. Although labels for trees, shrubs, wildflowers and other plants will outnumber other subjects, try to interpret other items on the trail, such as geology, plant succession and other ecological features. Birds, mammals, insects, etc., are more difficult to "pin down" so use labels to alert students to the fact that they have entered a place, for instance, where a yellow warbler is nesting, or where a turtle is often seen.

Each student will want to think of particularly good labels for his "adopted tree". If one has chosen a Red Cedar, he might use the following phraseology for his label: "This lead-pencil tree, Red Cedar, is the favorite wood for making lead pencils. It is also used for cedar chests. Smell it!"

MATERIALS NEEDED FOR NATURE TRAIL:

A path through fields, woods, or marsh
Signs or labels such as the following:

- Linen tags marked with India ink waterproofed with spray plastic, melted paraffin, or linseed oil
- Masonite or plywood labels
  - Cover with two coats of flat white paint.
  - Label with India ink and add two coats of varnish or plastic spray.
- Zinc sheets treated the same as masonite or plywood
- File cards lettered with India ink and waterproofed in the same way as linen tags.

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I SPY

Hide some small object (pebble, pinecone, etc.) in plain sight, where it is not obvious. Everybody looks for it. When someone sees it, he must not show that he has found it, but must come over and report to the scorekeeper.

VARIATION: Hide a number of small items where they are in full sight, but hard to see, such as a twig on the ground under a tree, a piece of grass on grass, a white clover near white daisies, a brown acorn on the brown earth, etc. Make a list of such items. Each child comes over and reports what he has noticed. First to report all the objects is Mr. Keen-Eye Spy.

Bug's Eye View

Everyone stretches out, eyes on grass level, to see what the world is like to a bug. The blade of grass is like a tree! The pebble is mountain-size---to a bug. Big things like trees just don't show. People are just feet.

I See a Color

One child looks around the area and selects some object in sight. He says, "I see something blue," or whatever color the object is. The others take turns trying to guess it. The first to guess correctly chooses the next object to be guessed.

VARIATION: To make this a bit harder and more interesting even for young children, add more dialogue, so that It and the others must be even more observant.

It says, "From where I sit (or stand) I see something blue" (or other color). The next person says, "Is it . . . ?", naming something he sees that is blue. It answers truthfully, "No, it's not. . ." Player #3 suggests something elese that is blue, and the game goes on until someone asks about the right object. He then becomes It.

This game is a sort of visual treasure hunt. Children always enjoy it. It's a good game, too, because it requires observation plus color identification.

Listening Corner, Post, Tree or Lean-to

Find some quiet, out-of-the-way place. Visit it with just one or two youngsters. Sit down, stay still, and enjoy the sounds that you'd miss if you didn't listen.

Look, too, at the little things you wouldn't see if you weren't quiet--a leaf suddenly twisting, a bit of red-capped moss, a bird's nest almost hidden.

Touch the tree behind you and feel its bark. Feel the sun on your hand, the softness of moss, the dry feel of dead leaves.

Indian Hike

Go in single file, v-e-r-y carefully. Try not to make a sound. Avoid stepping on dry twigs or through dry leaves. Don't talk above a whisper. Stop frequently to listen as well as look. What sounds can be heard?

Listen for wind, song of a bird, rustle of some small animal, a distant plane, water running, leaves rustling, squirrel chattering, insect humming. Look for sources of all the sounds.

Grab Bag

Collect about fifteen articles, such as a pinecone, acorn, piece of bark, moss, pebble, shell, feather, milkweed pod, burr, etc. Put each in a small plastic bag. Pass the bags around quickly to the blindfolded youngsters until everybody has had a fast feel. Then each person tries to list as many articles as he can. Longest listing wins.

VARIATION: Place all the objects in one plastic bag, and pass it around the circle. Each person may take only a very quick feel; then everyone writes down as many objects as he can identify and remember.

From Where I Sit

A good game to play while resting or looking at an interesting view. Each child takes turns in naming one thing at a time that he can see from where he sits, but which has not been named before.

Go Get It

Get the children into two teams, A and B, each with a captain, and number off. The teams stand facing each other, Player A1 facing Player B1, and so on. You stand at the end, an even distance between each team.

To start the game, call out something that you can see, or know is nearby, such as "A leaf with smooth edges--Number 5!" Both players # 5 must dash to get a leaf with smooth edges and bring it back to you. The first to do so scores a point for his team. Then call out some other item, and another player number, and so on. Items might include:

a white flower
a pebble that shines
a tree twig
a seed
a nut
a bit of moss
a live insect
a pinecone
a burr
a feather

Leaf Snatch

Collect all sorts of leaves from trees common to your locale, and put them in a large flat box, or in a large pile. The boys and girls form two teams, each team facing the box of leaves that is about ten to fifteen feet away. Call out "a hickory leaf!" (or other variety). The first player on each team must dash to the box, find a hickory leaf, and return to his team, going to the foot of the line.

Players # 2 then advance to first place. At the signal, they each dash to the box to find whatever variety of leaf you call for. This goes on until each youngster has had his turn.

The first one back in each dash wins a point for his team. BUT check the leaves! Anyone with the wrong variety loses a point for his team. You'll find that this game will encourage quick identification.

Nature Alphabet

Divide the players into teams if the group is large and work together. If only a few play, each can play as an individual.

Give each child a paper or plastic bag, and a sheet of paper containing theletters of the alphabet. The teams go out, and must find some object starting with one of the letters of the alphabet (such as acorn for A, briar for B, etc.) within a given time limit. The person or team with the most letters of the alphabet accounted for, wins.

Chivas

A skill-and-chance game from Mexico. Each person has a handful of small beans or pebbles, equal number per player. Players line up behind a line eight feet in front of a small hole in the ground, or small bowl. In turn, each youngster tosses all his beans toward the hole. If some go into the hole, he takes these, puts them in the palm of his hand, tosses them into the air and tries to catch them on the back of his hand. Those caught are tossed from the back of the hand into the air and caught in the palm.

The player with the greatest number in the palm, when everyone has had a turn, wins. Try this on teenagers, too. They'll like it; it's great!

When played in a picnic area, or where there is litter, add it to the list. The hunt can help in a cleanup job.

Items on a nature scavenger hunt list might include, depending upon the locale, such things as:

pinecone
dead branch
pointed leaf
white pebble
dandelion
acorn
feather
daisy
shiny pebble
shed bark
shell
seedpod
round pebble
black pebble
berry

ABC Hunt

Following safety and conservation rules, each person or group goes out to collect some object for every letter of the alphabet, or as many of the letters of the alphabet as possible, within a thirty-minute period, or some other time allotment or signal. When time is up, or the signal given, each must return, no matter how many objects he still hasn't found.

When they assemble, each lists his objects alphabetically, such as:

A: apple (or acorn, ash leaf, etc.)
B: bettle (or beech leaf, briar, etc.)
C: catnip (or catalpa leaf, caterpillar, etc.)

VARIATION: Each person goes off and must find an object beginning with an A. He brings it in to the scorekeeper who checks it off against his name. The player then dashes out after some object starting with B. So on, until someone completes the list or has collected a longer list than the others. Set up a point system, giving extra credit for any item not brought back by any other player.

Shape Hunt

Players lean the shapes meant by words like star, crescent, oval (or ellipse), triangle, octagon, hexagon, oblong (or rectangle), spiral (or helix).

Then they set out to try to find some natural object that is somewhat like each of these shapes.

Nature's Zoo

Each person gets a set time--fifteen minutes or half-hour, depending upon the locale--to find some natural object that looks like something else, or that can be made to look like something else by adding a berry for an eye, a feather or other natural objects.

Driftwood, roots, bark, cones, stones, seedpods, shells, vines, tree branches and twigs are possible sources. Everybody finds his own and prepares it for an all-group exhibition.

Progressive Hike

For arousing nes interest in familiar areas, and giving everybody a chance to be the leader. Prepare numbered notes for quests using one or more of the senses. The first person to find the object of the first quest shows it to the group and becomes the leader up to the nest stopping place. Add some little stunts or special requirements, just for variation and exercise. Scme sample notes follow:

> Note #1: Find five leaf shapes. First person to do so must show them to the entire group, and they must do as he does. He must tkae fifteen giant steps and ten lady steps in the direction his shadow points, thenread Note #2.
> Note #2: Close eyes and listen. First person to identify four natural sounds may take group on a four-legged walk to nearest big rock, tree or other object and read Note #3.
> Note #3: Go to the nearest evergreen (or other) tree, and look for signs of insects within ten feet. If six signs can be found, go twenty steps, then walk like a crab (sideways) for twenty feet. If less than six signs can be found, return to the rock and tell a rigmarole story about how the rock came to be there.